The PHOTOFACT® Servicer

SET 539 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ JULY 1961

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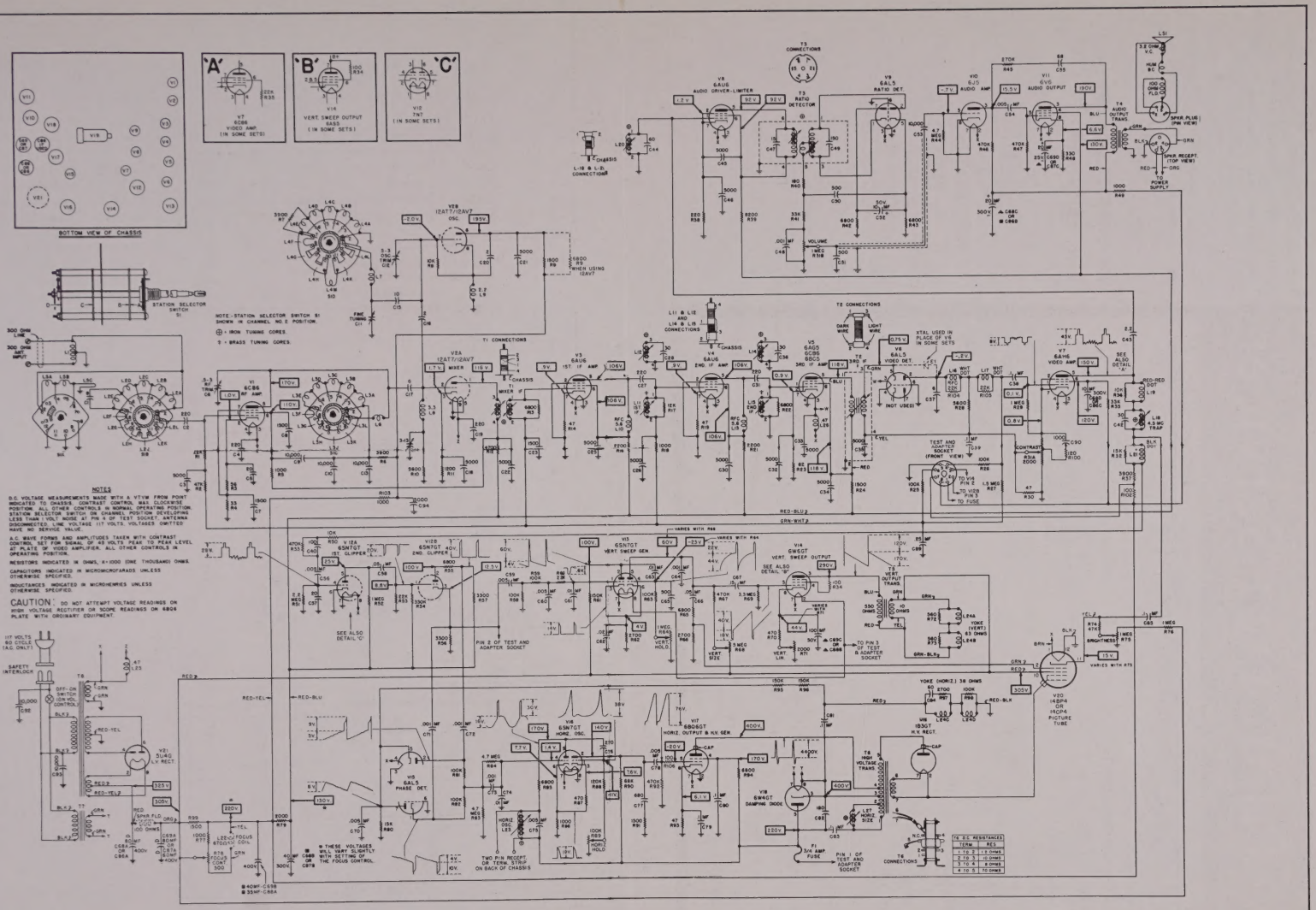
This Servicer provides you with essential data on other models or special equipment not covered in standard PHOTOFACT folders. The schematics and supplementary data included here will be of valuable help to you in servicing this equipment.

IN THIS ISSUE OF THE SERVICER:

Motorola Chassis
TS-114A

Silvertone Model 1391
(CH. 185.10100)



MOTOROLA CHASSIS TS-114A

Schematic Diagram Courtesy of Motorola Inc.

	Part No.	
C1	20-016	Tubular, .01 mfd., 600 v.
C2, C4	20-026	Tubular, .02 mfd., 600 v.
C3, C8	20-056	Tubular, .05 mfd., 600 v.
C5	25-1025	Electrolytic, 10 mfd., 25 v.
C6	30-580	Trimmer Cond., 5-80 mmfd.
C7A, C7B	25-1010	Electrolytic, 10-10 mfd., 450 v.
T1	91-5683	Output Transformer
T2	91-25969	Power Transformer
	91-68	Fuse Holder
	91-2019	"On-Off" Switch

	Part No.	(All Resistors ½ watt unless otherwise noted)
R1, R2	18-68302	68K ohm, 20%
R3	22-10513	1 megohm, Tone
R4	22-10512	1 megohm, Volume
R5	18-15602	15 megohm, 20%
R6	18-39402	390K ohm, 20%
R7	18-56402	560K ohm, 20%
R8	18-27111	270 ohm, 10%, 1 watt
R9	18-22502	2.2 megohm, 20%, 1 watt
R10	18-15201	1.5K ohm, 10%
R11	18-15301	15K ohm, 10%

Part No.	Description
91-32	Cabinet and Back
91-128	Leather Handle
91-88	Handle Hardware
91-186	Rubber Feet (4)
91-832	8" Speaker 3.2 ohm imp.

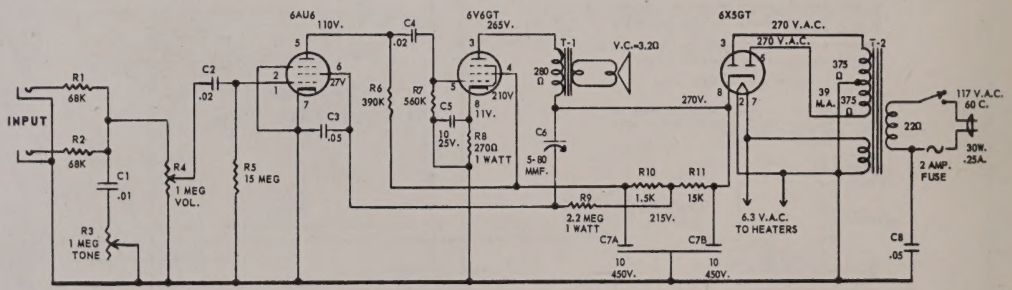
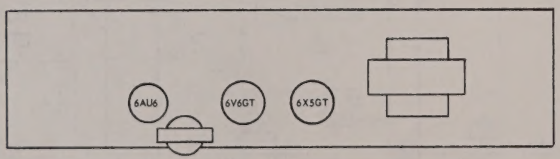


FIG. 1. SCHEMATIC DIAGRAM OF SILVERTONE CHASSIS 185.10100



NOTES:

1. VALUES OF CAPACITORS IN MFD. UNLESS OTHERWISE NOTED.
2. ALL RESISTORS ARE ½ WATT UNLESS OTHERWISE NOTED.
3. VOLTAGES MEASURED FROM POINTS INDICATED TO CHASSIS WITH 20,000 OHM/VOLT METER.

SILVERTONE MODEL 1391 (CH. 185.10100)

Information Courtesy of Sears, Roebuck & Company

PHOTOFACT® Folder with CIRCUITRACE*

PACKARD-BELL MODELS 21K3, 23C4, 23K1, 23K2, (Ch. 88-10, 88-11)

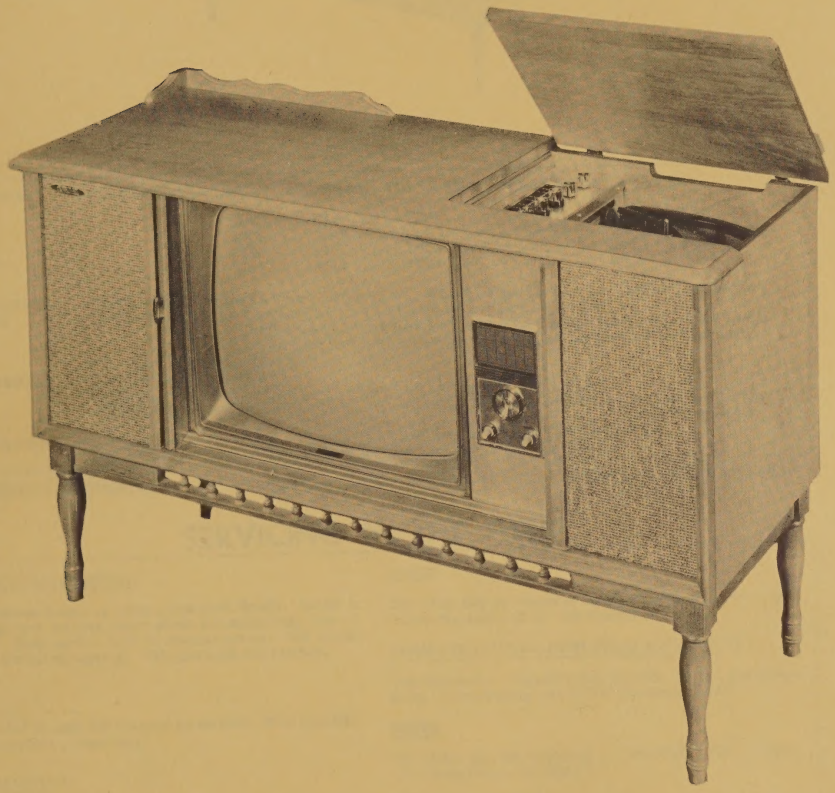
IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

PACKARD-BELL MODELS 21K3, 23C4, 23K1, 23K2, (Ch. 88-10, 88-11)

PACKARD-BELL MODELS 21K3, 23C4, 23K1, 23K2, (Ch. 88-10, 88-11)



MODEL 23K1

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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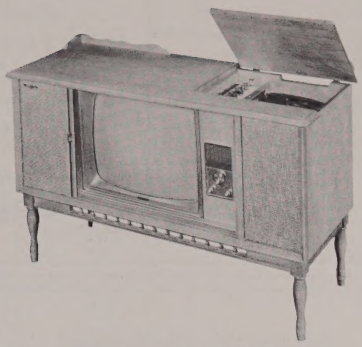
PACKARD-BELL MODELS 21K3, 23C4, 23K1, 23K2, (Ch. 88-10, 88-11)

PACKARD-BELL MODELS 21K3, 23C4, 23K1, 23K2, (Ch. 88-10, 88-11)



MODEL 23K1

TRADE NAME	PACKARD-BELL MODEL	TV Chassis	FM-AM Tuner	Remote Control	VHF Tuner
	21K3	88-11	7TU5		10672 or 10677
	23C4	88-10		RM-500	10643B or 10684A
	23K1	88-11	7TU5		10672 or 10677
	23K2	88-11	7TU5		10672 or 10677
MANUFACTURER	Packard-Bell Electronics Corp., Service Div., 1920 So. Figueroa St., Los Angeles 7, California				
TYPE SET	Television Receiver— Models using TV Chassis 88-10 have Remote Control; Models using TV Chassis 88-11 (with Dual Channel Audio Amp) have FM-AM Tuner (with Dual Channel Preamp) and 4 Speed Automatic Record Changer *				
TUBES	TV: VHF - Nineteen FM-AM Tuner: Seven				
POWER SUPPLY	110-120 Volts AC, 60 Cycle				
RATING	TV (Selector Switch in TV Position) - 220 Watts, 2 Amp. @ 117 Volts AC FM-AM Tuner (Selector Switch in FM, AM, or Phono Position) - 140 Watts, 1.3 Amp. @ 117 Volts AC, Less Phono Motor				
TUNING RANGE	TV: Channels 2 thru 13 VHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier) FM-AM Tuner: BC-530 to 1620KC (455KC IF) FM-88 to 108MC (10.7MC IF)				

* FOR SERVICE INFORMATION ON RECORD CHANGER #5887C - SEE SIMILAR UNIT - PHOTOFACT SET 436 FOLDER 18

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Press bottom center of safety glass back firmly. Insert a business card between safety glass and metal trim (left of center). Slide card to right to depress spring. Lift metal trim at bottom straight up. Tilt glass out and remove.

FUSE

A fuse wire is used for filament protection. (For location, see MI in photo , Page 26.)

FUSE DEVICE

A Circuit Breaker is used for low voltage power supply protection, and may be reset by depressing the reset button. (For location, see "Tube Placement Chart".)

TUNER OSCILLATOR ADJUSTMENT

To touch up the VHF Oscillator, remove Channel Selector and Fine Tuning knobs.

AGC

The AGC may be varied by means of an AGC Control. (See "Tube Placement Chart" for location.)

FOCUS

The focus may be varied by means of a Focus Control. (See "Tube Placement Chart" for location.)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The Horizontal Frequency Slug is used for the Horizontal Hold. (For location, see "Tube Placement Chart".)

WIDTH

The width may be varied by a Width Coil. (For location, see "Tube Placement Chart".)

HORIZONTAL DRIVE

The horizontal drive may be varied by a Horizontal Drive Control. (For location, see "Tube Placement Chart".)

BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Ratio Detector secondary (A10) located at bottom of chassis.

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

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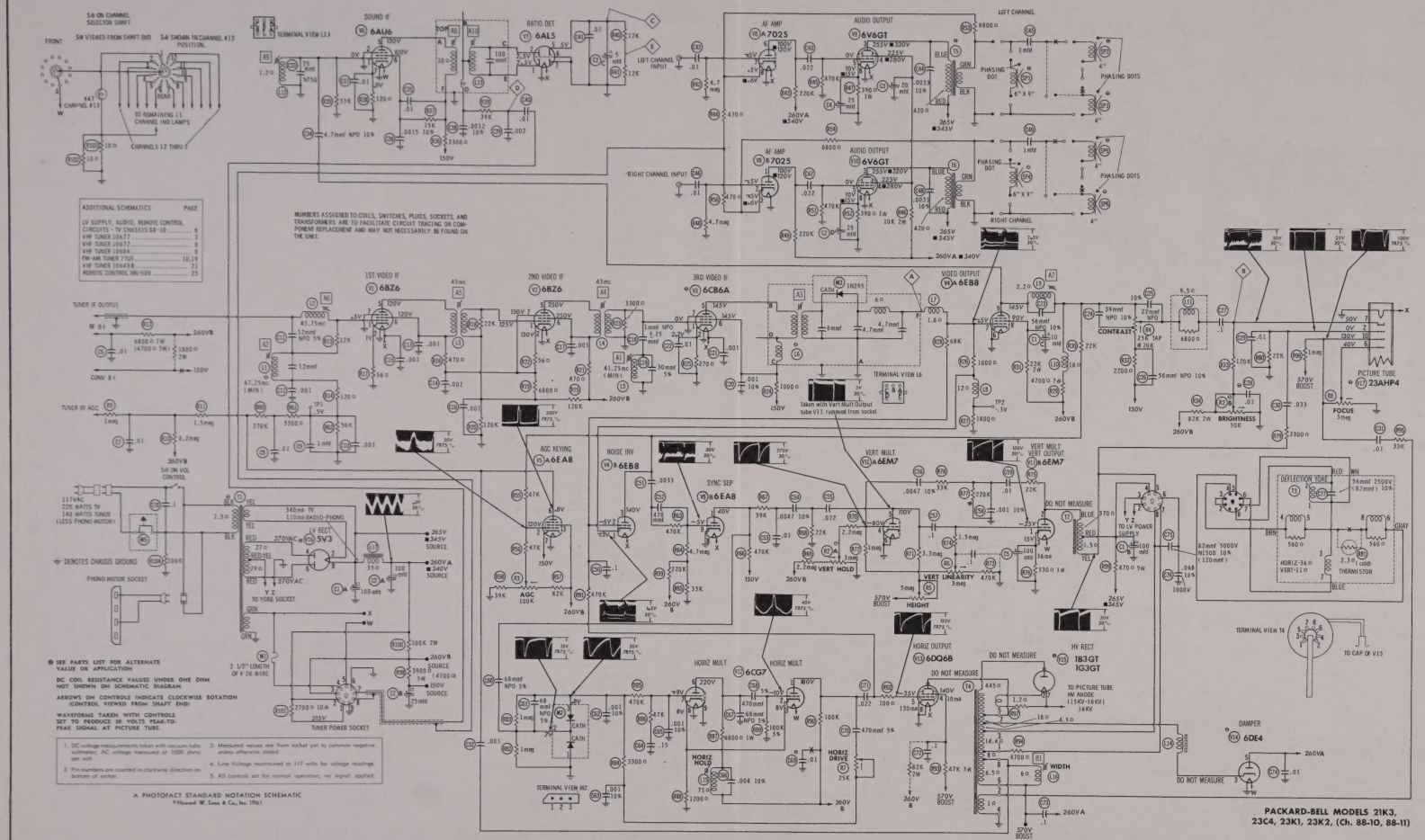
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1961 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America


PACKARD-BELL MODELS 21K3, 23C4, 23K1, 23K2 (Ch. 88-10, 88-11)
FOLDER 1
PAGE 2
PAGE 27
PACKARD-BELL MODELS 21K3, 23C4, 23K1, 23K2, (Ch. 88-10, 88-11)
A PHOTOFACT STANDARD NOTATION SCHEMATIC
*Howard W. Sams & Co., Inc. 1961
ADDITIONAL SCHEMATICS PAGE
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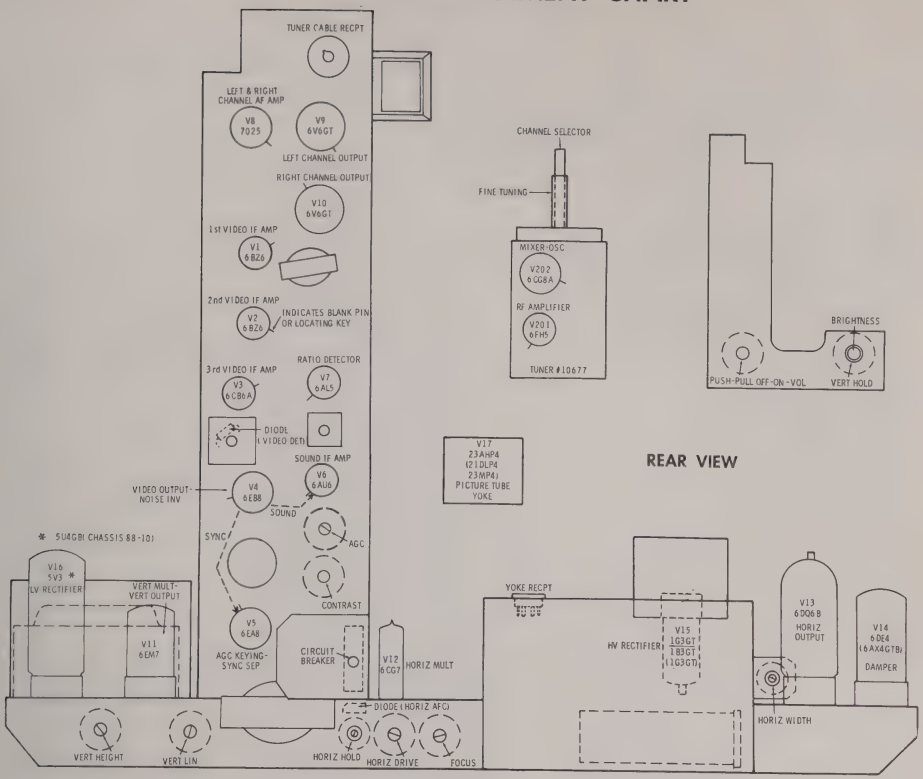
VHF TUNER 10677 7
VHF TUNER 10872 8
VHF TUNER 10884 8
FM-AM TUNER 7105 10,14
VHF TUNER 10645B 21
REMOTE CONTROL 300-509 23
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.
DENOTES CHASSIS GROUND
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
TERMINAL VIEW L3
TERMINAL VIEW L6
TERMINAL VIEW M2
TERMINAL VIEW T4
TUNER POWER SOCKET
PHONO MOTOR SOCKET
TO YOKE SOCKET
TO CAP OF V15
TO PICTURE TUBE HV ANODE (115V-180V) 16KV
DO NOT MEASURE
SOUND IF
RATIO DET
AF AMP
AUDIO OUTPUT
LEFT CHANNEL
RIGHT CHANNEL
PHASING DOTS
1ST VIDEO IF
2ND VIDEO IF
3RD VIDEO IF
VIDEO OUTPUT
CONTRAST
BRIGHTNESS
FOCUS
PICTURE TUBE
NOISE INV
SYNC SEP
AGC KEYING
VERT MULT
VERT OUTPUT
VERT HOLD
VERT LINEARITY
HEIGHT
HORIZ MULT
HORIZ OUTPUT
HORIZ HOLD
HORIZ DRIVE
HV RECT
DAMPER
WIDTH
DEFLECTION YOKE
THERMISTOR
TUNER IF OUTPUT
TUNER RF AGC
CONV B+
AGC
570V BOOST
260V B
260V A
260V B
150V
265V
345V
SOURCE

TV TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

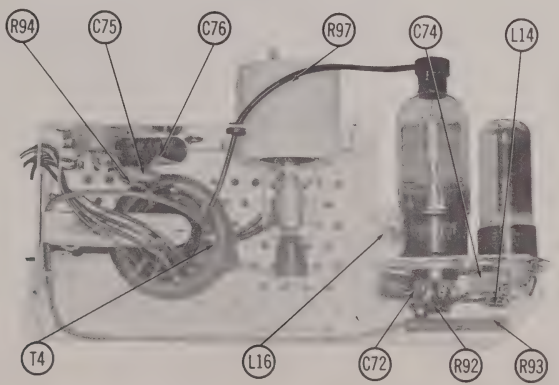
POWER SUPPLY FAILURE
No raster, no sound Circuit Breaker, V16, Fuse Wire (Fil.)

SWEEP FAILURE
No raster, has sound V12, V13, V14, V15, V17
No vertical deflection V11
Poor vert. linearity or foldover V11
Poor horiz. linearity or foldover V12, V13, V14
Narrow picture V12, V13, V14, V16
Vert. off freq. V11
Horiz. off freq. Diode (Horiz. AFC), V12

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, Diode (Video Det.), V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V17
Has pic, no sound V6, V7, V8 (See FM-AM Tuner Preamp or T V Audio Amp Section)
Overloaded picture V5

SYNC FAILURE
No vert. sync V5
No horiz. sync V5 (Diode, Horiz. AFC)
No vert. or horiz. sync V5

HIGH VOLTAGE COMPARTMENT



TV ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: A1, A4, A5, A6, A9 .... GENERAL CEMENT #8721, 8722
WALSCO #2519
A2, A3, A7, A8, A10 .... GENERAL CEMENT #8282, 8606, 8606L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545

VIDEO IF ALIGNMENT

Connect the negative lead of a 6 volt bias supply to point TP-1. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough generator output to provide a usable indication.

	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Place a thin insulated metal strip between the Mixer-Osc. tube and the tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	Not Used	41.25MC (Unmod.)	Any non-interfering channel	Use VTVM DC probe thru 10K to point (A). Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	"	"	47.25MC	"	"	A2	"
3.	"	"	44.0MC	"	"	A3	Adjust for maximum deflection.
4.	"	"	43.0MC	"	"	A4	"
5.	"	"	45.0MC	"	"	A5	"
6.	"	"	45.75MC	"	"	A6	"
7.	"	"	43.0MC	"	"	Mixer Plate Coil	"
8.	"	44.0MC (10MC Swp.)	41.25MC 43.0MC 45.0MC 45.75MC 47.25MC	"	Vert. Amp. of scope thru 22K to point (A). Low side to chassis.		Check for response similar to Fig. 1 with markers as indicated. If necessary, retouch Mixer Plate Coil to adjust low frequency slope of curve, A6 to adjust high frequency slope of curve and A3 to control tilt or flatten top of response. A5 may be adjusted to place 45.0MC marker at corner of response.

4.5MC TRAP ALIGNMENT

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	High side thru .01mfd to point (A). Low side to chassis.	4.5MC (Unmod.)	Any non-interfering channel	AC probe to point (B). Common to chassis.	A7	Adjust for MINIMUM deflection.

SOUND IF ALIGNMENT

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	High side thru .01mfd to point (A). Low side to chassis.	4.5MC (Unmod.)	Any non-interfering channel	DC probe to point (C). Common to chassis.	A8, A9	Adjust for maximum deflection.
11.	"	"	"	DC probe to point (D). Common to point (E).	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

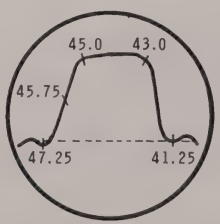
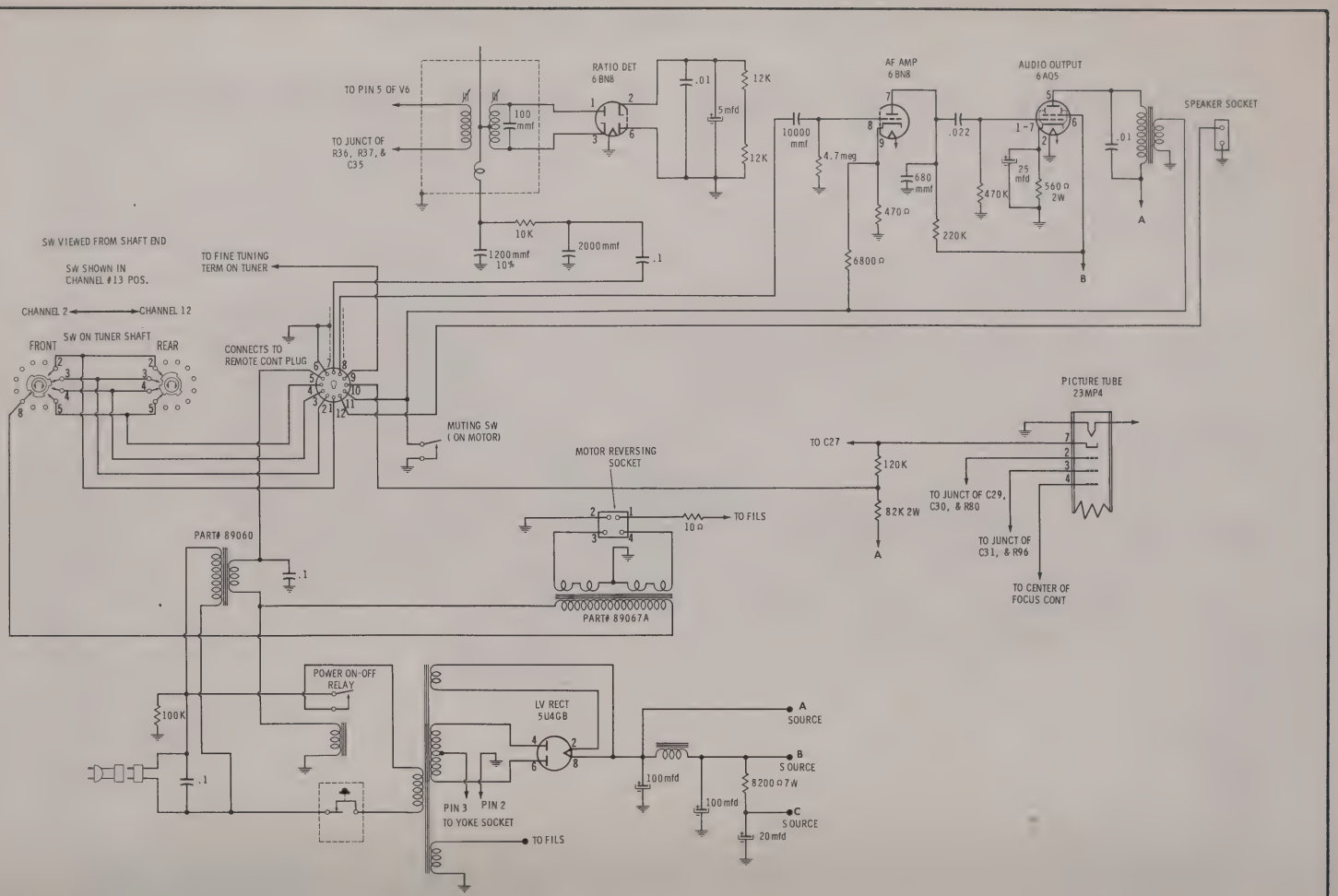


FIG. 1

POWER & SWEEP CHASSIS - BOTTOM VIEW



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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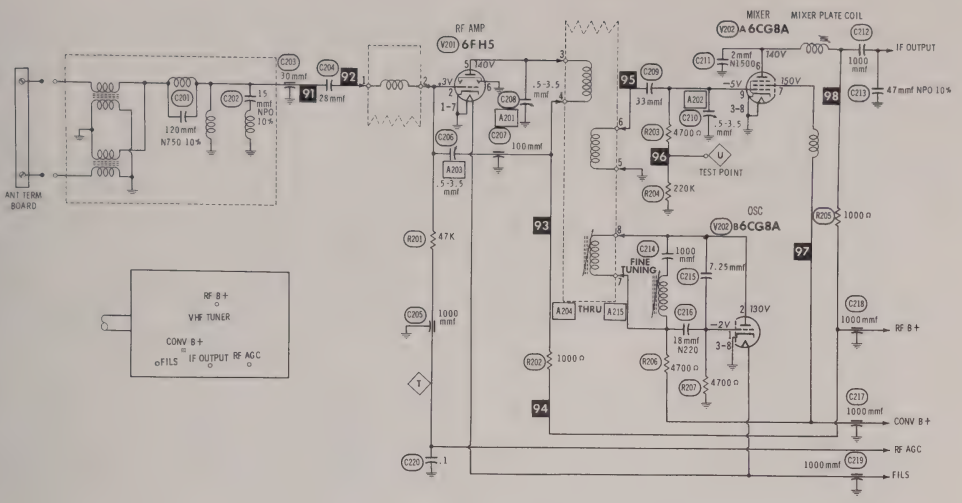
LV SUPPLY, AUDIO, REMOTE CONTROL CIRCUITS - TV CHASSIS 88-10



A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE

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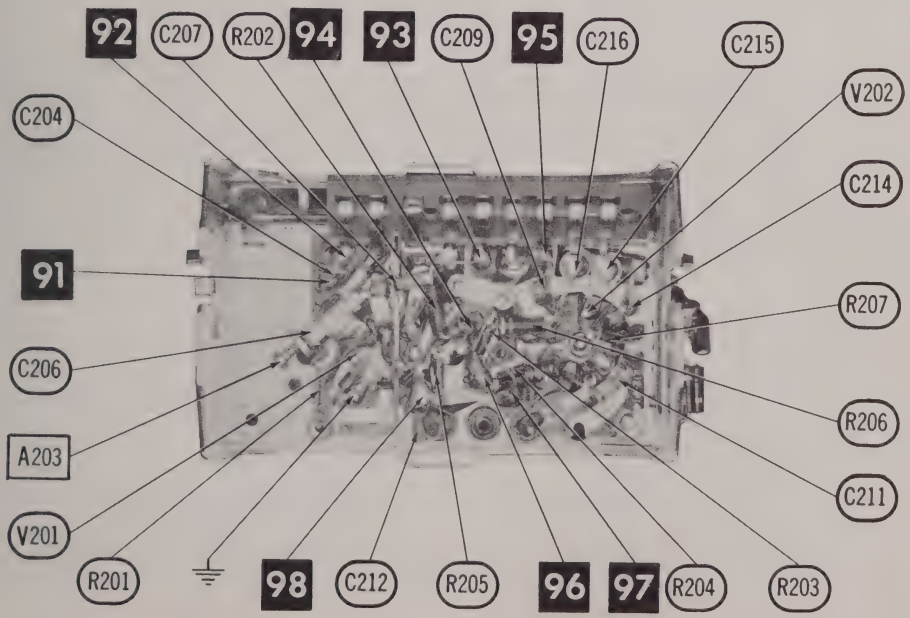
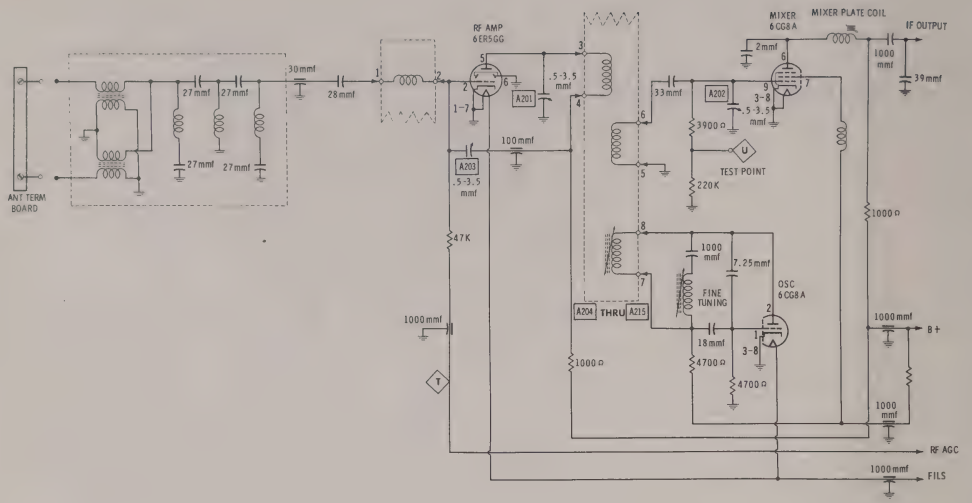
VHF TUNER 10677



A Howard W. Sams CIRCUITRACE Photo

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

VHF TUNER 10677 - BOTTOM VIEW



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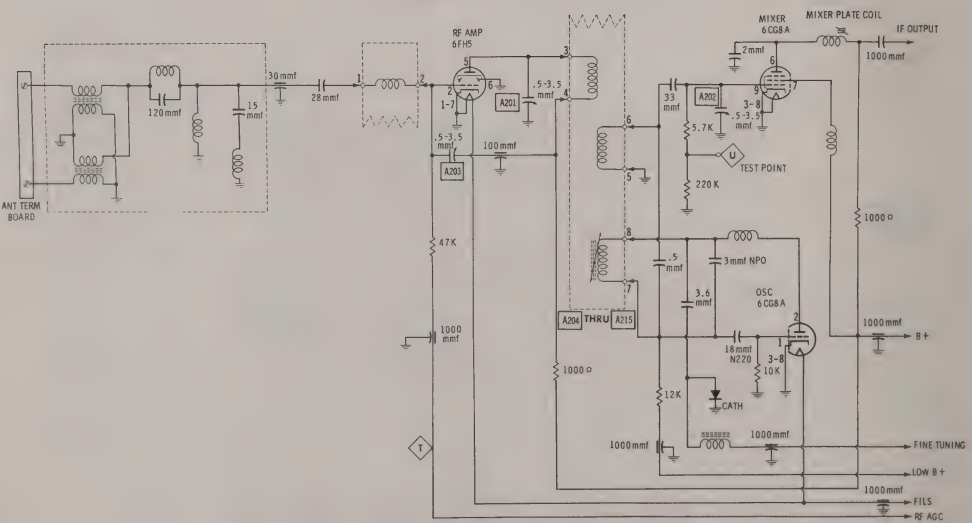
VHF TUNER 10672



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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VHF TUNER 10684

TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested alignment tools: A201, A202 and A203.....GENERAL CEMENT #5000, 5003, 8276, 8290
WALSCO #2512, 2525
A204 thru A215.....GENERAL CEMENT #8607, 9291
WALSCO #2520, 2522, 2523, 2524, 2537

RF AND MIXER ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to point Ⓣ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC	193.25MC 197.75MC	10	Vert. Amp. thru 10K to point Ⓥ. Low side to chassis	A201 A202 A203	Adjust A201 and A202 for maximum amplitude and symmetry with markers as shown in Fig. 201. Increase bias for MINIMUM amplitude of response curve. Without changing the bias adjust A203 to obtain MINIMUM response on the scope.
2.	"	"	213MC	211.25MC 215.75MC	13	"		Check for response similar to Fig. 201. If markers fall below 70% on any channel, make compromise adjustment of A201 and A202 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			207MC	205.25MC 209.75MC	12			
			201MC	199.25MC 203.75MC	11			
			195MC	193.25MC 197.75MC	10			
			189MC	187.25MC 191.75MC	9			
			183MC	181.25MC 185.75MC	8			
			177MC	175.25MC 179.75MC	7			
			85MC	83.25MC 87.75MC	6			
			79MC	77.25MC 81.75MC	5			
			69MC	67.25MC 71.75MC	4			
			63MC	61.25MC 65.75MC	3			
			57MC	55.25MC 59.75MC	2			

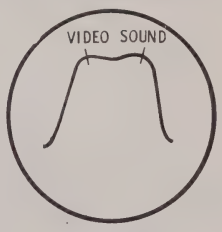


FIG. 201

VHF OSCILLATOR ALIGNMENT

Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the Fine Tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K across video det. load.	A204	Adjust to place sound marker in trap notch as in Fig. 202. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A205	
			201MC	199.25MC 203.75MC	11		A206	
			195MC	193.25MC 197.75MC	10		A207	
			189MC	187.25MC 191.75MC	9		A208	
			183MC	181.25MC 185.75MC	8		A209	
			177MC	175.25MC 179.75MC	7		A210	
			85MC	83.25MC 87.75MC	6		A211	
			79MC	77.25MC 81.75MC	5		A212	
			69MC	67.25MC 71.75MC	4		A213	
			63MC	61.25MC 65.75MC	3		A214	
			57MC	55.25MC 59.75MC	2		A215	

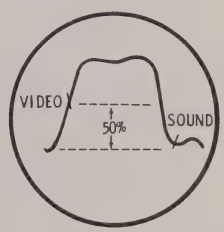
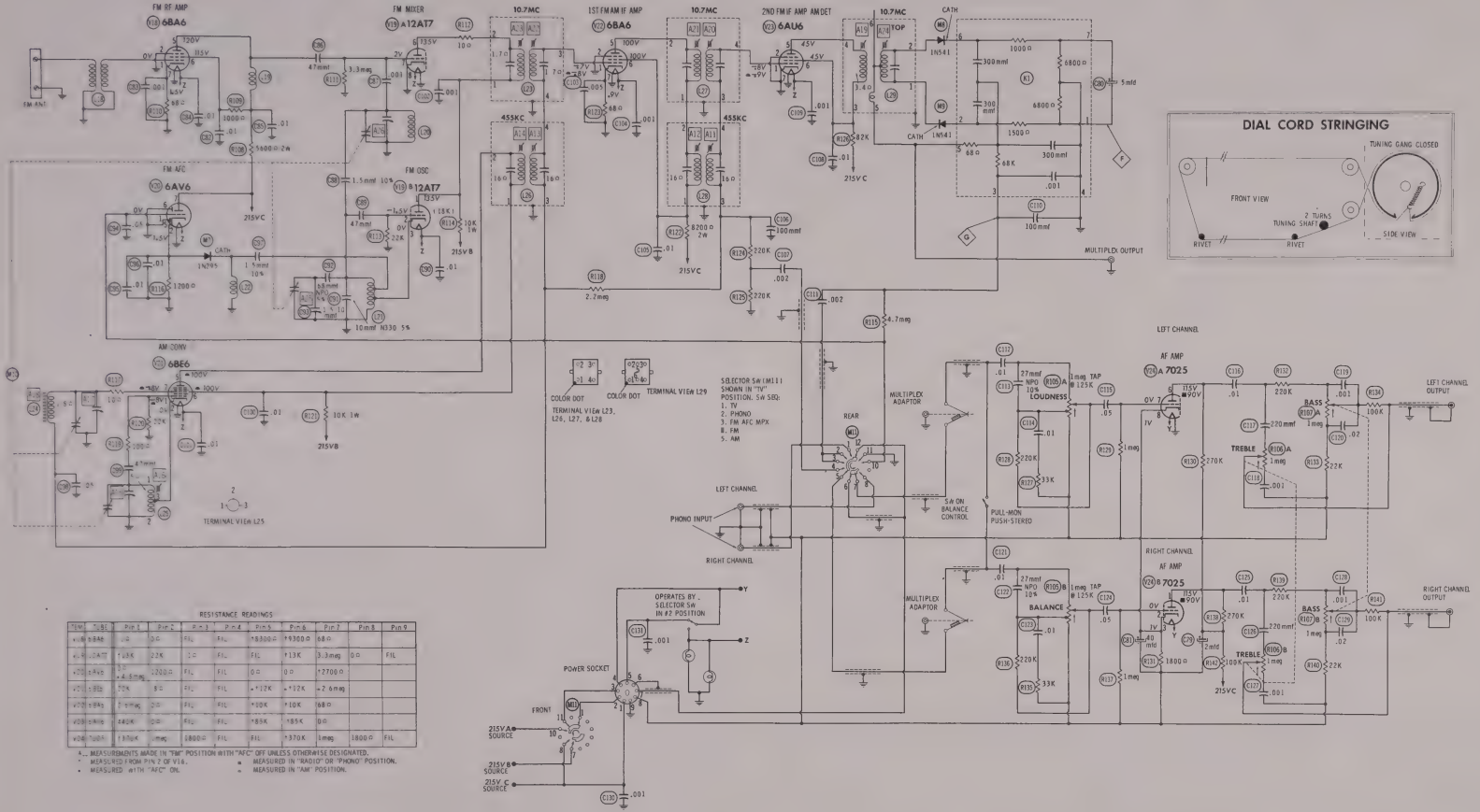


FIG. 202



RESISTANCE READINGS

TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V18 6BA6	0Ω	0Ω	FIL	FIL	*8300Ω	*9300Ω	68Ω		
V19 A12AT7	*18K	22K	0Ω	FIL	FIL	*13K	3.3meg	0Ω	FIL
V20 6AV6	0Ω	1200Ω	FIL	FIL	0Ω	0Ω	*2700Ω		
V21 6BE6	70K	0Ω	FIL	FIL	=*12K	=*12K	=2.6meg		
V22 6BA6	1.5meg	0Ω	FIL	FIL	*10K	*10K	68Ω		
V23 6AU6	140K	0Ω	FIL	FIL	*85K	*85K	0Ω		
V24 7025	130K	meg	6800Ω	FIL	FIL	*370K	1meg	1800Ω	FIL

1. MEASUREMENTS MADE IN "FM" POSITION WITH "AFC" OFF UNLESS OTHERWISE DESIGNATED.
* MEASURED FROM PIN 7 OF V16.
= MEASURED IN "RADIO" OR "PHONO" POSITION.
• MEASURED WITH "AFC" ON.
≈ MEASURED IN "AM" POSITION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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FM-AM TUNER 7TU5

FM—AM ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

Use only enough generator output to provide a usable indication.
Suggested Alignment Tools: All thru A14 ..... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8729, 8987, 8988, 8989
WALSCO #2515, 2531, 2532
A15, A17, A25, A26 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A16, A19 thru A24 ..... GENERAL CEMENT #8282, 8606, 8606L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545

AM ALIGNMENT - SELECTOR IN AM POSITION

Loudness control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .01mfd to pin 7 (grid) of AM Converter. Low side to chassis.	455KC (400~ 30% AM)	AM Tuning gang fully open	Across Voice Coil	A11, A12, A13, A14	Adjust for maximum output.
2.	Loop	1620KC	"	"	A15	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	530KC	Tuning gang fully closed	"	A16	"
4.	"	1500KC	1500KC Signal	"	A17	"
5.	"	610KC	610KC Signal	"	A18	Adjust for maximum output by sliding coil along ferrite rod.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM - SELECTOR IN FM POSITION

Pull AFC switch to Off position.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	High side thru .01mfd to pin 7 (grid) of FM Mixer. Low side to chassis.	10.7MC (Unmod.)	FM Point of non-interference	DC probe to point (F). Common to chassis.	A19, A20, A21, A22, A23	Adjust for maximum deflection.
7.	"	"	"	DC probe to point (G). Common to chassis.	A24	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE - SELECTOR IN FM POSITION

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection. Pull AFC switch to Off position.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6.	High side thru .01mfd to pin 7 (grid) of FM Mixer. Low side to chassis.	10.7MC (450KC Swp)	FM Point of non-interference	Vert. Amp. to point (F). Low side to chassis.	A19, A20, A21, A22, A23	Disconnect stabilizing capacitor C80. Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown. Reconnect C80.
7.	"	"	"	Vert. Amp. to point (G). Low side to chassis.	A24	Adjust to place marker at the center of crossover lines similar to Fig. 3. SLIGHTLY retouch A19 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT - SELECTOR IN FM POSITION

Pull AFC switch to Off position.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	Across FM antenna terminals with 150Ω in each lead.	106MC (Unmod.)	FM 106MC	DC probe to point (F). Common to chassis.	A25, A26	Adjust for maximum deflection.
9.	"	92MC	92MC	"	L20, L21	Adjust for maximum deflection by expanding or compressing coil turns.

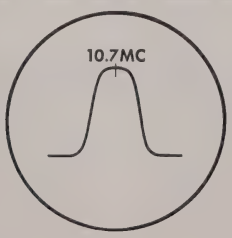


FIG. 2

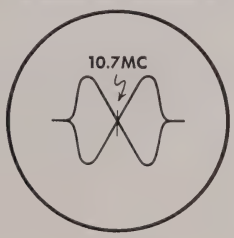
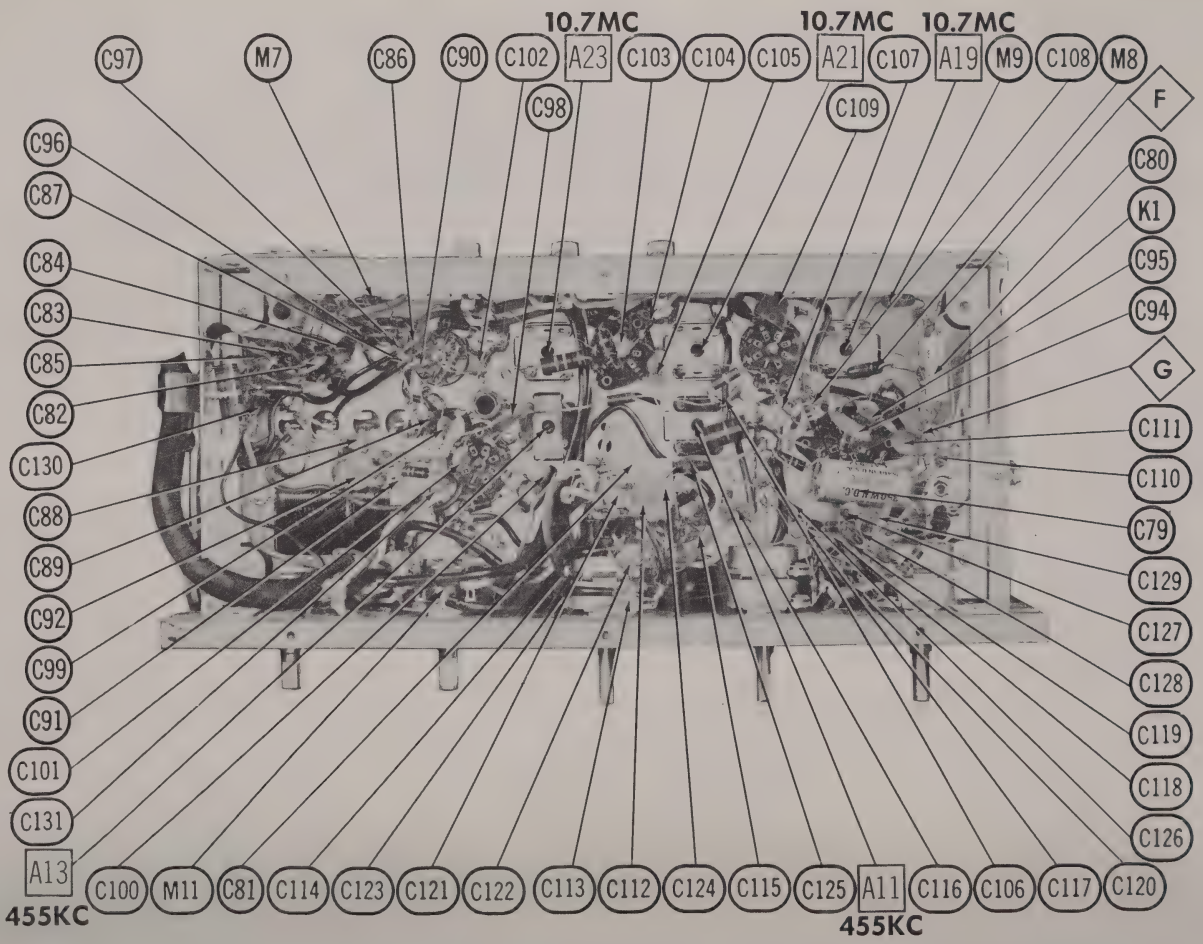


FIG. 3



FM-AM TUNER 7TU5 BOTTOM VIEW - ALIGN., CAPACITOR, MISC. IDENT.

TV PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	1st Video IF Amp.	6BZ6	V9	Left Channel Output	6V6GT
V2	2nd Video IF Amp.	6BZ6	V10	Right Channel Output	6V6GT
V3	3rd Video IF Amp.	6CB6A	V11	Vert. Mult. - Vert. Output	6EM7
V4	Video Output - Noise Inv.	6EB8	V12	Horiz. Mult.	6CG7
V5	AGC Keying - Sync Sep.	6EA8	V13	Horiz. Output	6DQ6B
V6	Sound IF Amp.	6AU6	V14	Damper	6DE4 (6AX4GTB)①
V7	Ratio Det.	6AL5	V15	HV Rectifier	1B3GT/1G3GT (1G3GT) ①
V8	Left Channel AF Amp. - Right Channel AF Amp.	7025	V16	LV Rectifier	5V3 ②

① Alternate

② Chassis 88-10 uses 5U4GB in this application.

PICTURE TUBE

ITEM No.	REPLACEMENT DATA					NOTES
	Packard-Bell PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
V17	23AHP4 * 21DLP4 † 23MP4 ▲	21DLP4 ①	23AHP4 ① 21DLP4 ① 23MP4 ①	21DLP4 ①	23AHP4 ② 21DLP4 ② 23MP4 ②	① Aluminized ② Silver Screen "85" * Models 23K1, 23K2 † Model 21K3 ▲ Model 23C4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Packard-Bell PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■100	350	24088	AFH3-29-85	C0238	FP332.4	TMT-3447	TVL-3689.3	
B	▲100	350							
C	▲10	350							
C2A	▲100	350	24204	AFH4-53-90	D0473.3	FP420.405	TMQ-4448	TVLS-4607.5 *	
B	■25	350							
C	▲5	50							
D	25	25							
C3	20	350	24064	PRS1735	BR2035	TC65	TD-20-350	TVA-1608	
C4	25	25	24006A	PRS1260	BBR25-25	TC26	TD-25-25	TVA-1205	
C5	100	25	24205	PRS1270	BBR100-25	TC2501	TD-100-25	TVA-1207	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C7	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C8	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C9	1.0 100V		P288N-1.0		CUB2W1	1DP-5-105	GEM-21	2TM-M1
C10	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C11	12 NPO 5%			TCZ-12	C10Q12C	CCTO-120	CNO-412	10TCC-Q12
C12	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C13	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C14	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C15	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C16	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C17	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C18	1 NPO ±.25mmf		NPO-DI 1.0	TCZ-1			CNO-510	10TCC-V10
C19	30 5%		1469-00003	TCZ-30	22R5Q3	CM-19B-300J		MS-43
C20	.001 10%		DI-1000	DD-102	5R5D1	CCD-102	GP210	10TS-D10
C21	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C22	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C23	56 NPO 10%		NPO-DI 56	TCZ-56	C10Q56C	CCTO-560	CNO-456	10TCC-Q56
C24	39 NPO 10%		NPO-DI 39	TCZ-39	C10Q39C	CCTO-390	CNO-439	10TCC-Q39
C25	22 NPO 10%		NPO-DI 22	DTZ-22	C10Q22C	CCTO-220	CNO-422	10TCC-Q22
C26	56 NPO 10%		NPO-DI 56	TCZ-56	C10Q56C	CCTO-560	CNO-456	10TCC-Q56
C27	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P10
C28	.01	Note 1	BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C29	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C30	.033 600V		P688N-033	DD-303	CUB6S33	6DP-3-333	GEM-6133	6TM-S33
C31	.01 600V		P688N-01	DD-103	CUB6S1	6DP-2-103	GEM-611	6TM-S10
C32	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C33	75 N750		N750-DI 75	DTN-75	C10Q75U	CCTN-750	CN7-475	10TCU-Q75
C34	4.7 NPO 10%		NPO-DI 7.5	DTZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C35	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C36	.0015 10%		DI-1500	DD-152	PM6DI5	CCD-152	GP215	10TS-D15
C37	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C38	.0012 10%		DI-1200	DD-121	5R5DI2	CCD-121	GP212	10TS-D12
C39	.002		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C40	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C41	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C42	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C43	.022 400V		P488N-022	DD-203	CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C44	.0033 600V 10%		V84C6D33-10%		PM6D33	6DP-1-332	GEM-16233	6TM-D33
C45	1.0 100V		P288N-1.0		CUB2W1	1DP-5-105	GEM-21	2TM-M1
C46	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C47	.022 400V		P488N-022	DD-203	CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C48	.0033 600V 10%		V84C6D33-10%		CUB6D33	6DP-1-332	GEM-16233	6TM-D33
C49	1.0 100V		P288N-1.0		CUB2W1	1DP-5-105	GEM-21	2TM-M1
C50	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C51	.0033 400V		P488N-0033	D6-332	CUB6D33	6DP-1-332	GEM-6233	6TM-D33
C52	470		DI-470	DD-471	BYA10T47	CCD-471	B-347	10TS-T47
C53	.01 600V		P688N-01	D6-103	CUB6S1	6DP-2-103	GEM-611	6TM-S10
C54	.0047 600V 10%		V84C6D47-10%		PM6D47	6DP-1-472	GEM-16247	6TM-D47
C55	.022 600V		P688N-022	DD-203	CUB6S22	6DP-2-223	GEM-4122	6TM-S22

TV PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C56	.0047 600V 10%		V84C6D47-10%		PM6D47	6DP-1-472	GEM-6247	6TM-D47
C57	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P10
C58	.001 600V 10%		V84C6D-10%		PM6D1	6DP-1-102	GEM-6D1	6TM-D10
C59	.01 600V		P688N-01	D6-103	CUB6D1	6DP-2-103	GEM-611	6TM-S10
C60	68 NPO 5%			DTZ-68	CNQ68C		CND-468	10TCC-Q68
C61	68 NPO 5%			DTZ-68	CNQ68C		CND-468	10TCC-Q68
C62	.001 400V 10%		V84C6D1-10%	DD-102	PM6D1	6DP-1-102	GEM-1621	6TM-D10
C63	.001 400V 10%		V84C6D-10%	DD-102	PM6D1	6DP-1-102	GEM-1621	6TM-D10
C64	.15 300V		P288N-15		CUB3P15	3DP-3-154	GEM-2015	3TM-P15
C65	.001 10%		DI-1000	DD-102	SR5D1	CCD-102	GP120	10TS-D10
C66	.004 10%		1464-004		1R5D4	CM-20B-402K	MS-3401	MS-24
C67	68 NPO 5%			DTZ-68	CNQ68C		CND-468	10TCC-Q68
C68	470 5%		1469-00047		5R5T47	CM-19B-471K	MC3244	MS-347
C69	.01	Note 1	BPD-01	DD-103	SR5D1	CCD-103	B-110	5HK-S10
C70	470 5%		1469-00047		5R5T47	CM-19B-471K	MC3244	MS-347
C71	.022 600V		P688N-022	DD-203	CUB6S22	6DP-2-223	GEM-6122	6TM-S22
C72	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P10
C73	.1 500V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P10
C74	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C75	83 5000V NI500 10% #34518 (130) †							
C76	.068 1000V 10%						GEM-10168	10TM-S68
C77	56 500V 10% (62) †						3DY-456	
C78	.1 300V		P288N-1	DF-104	CUB2P1	3DP-3-104	GEM-301	3TM-P10

Note 1. Not used in Chassis 88-10. † Value used in Chassis 88-10. ¢ Packard-Bell Part Number.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	Not Used		86091	BPL-70	C47S-1meg-Z	B1I-137 *	PP16A	Volume
B	Shaft			Not Req.	S2S-1	Not Req.	Not Req.	
C	Switch			Not Req.	Not Req.	SK7 *	Not Req.	Push-Pull Off-On
R2B	3meg	½	25802 ①	FI-78			E4233	Vert. Hold
B	500K	½		R3-28				Brightness
R3A	100K	½	25633	TT-40	B47-100K-S	B1I-128	PTA151	AGC
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R4A	25K	½	25626	Not Req.		B20-12X	UT-415	Contrast
B	30K Tap	½				SK8		
R5A	5meg	½	25910	AB-87	B47-5meg-S	HLC-5	PTA56L	Height
B	Shaft			AK-1	Not Req.	Not Req.	Not Req.	
R8	3meg	½	25867	TT-84	B47-3meg-S	HLC-3	SU-59	Vert. Linearity
R7A	25K	½	25923	TT-26	B47-25K-S	B1I-130	TA2S1L	Horiz. Drive
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R6A	5meg	½	25910	AB-87	B47-5meg-S	HLC-5	PTA56L	Focus
B	Shaft			AK-1	Not Req.	Not Req.	Not Req.	

① Chassis 88-10 uses single 3meg Vert. Hold (Part #25633A). * Factory Assembled Part #PPQ11-137 (SKT).
■ "ITA-LOC" Equivalent: FA361, RU54L, O8875A, IS137S.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: WORKMAN TV PART No.	REMARKS
R9	1meg			
R12	5.1meg			
R13	1.5meg			
R20	6800Ω 5% 7W ①	PWT-6800	TG-6800	
R11	12K			
R14	120Ω			
R15	120K			
R16	4.7MΩ			
R17	56Ω			
R18	22K			
R19	6800Ω			
R20	120K			
R21	470Ω			
R22	56Ω			
R23	3300Ω			
R24	1000Ω			
R25	270Ω			
R26	1000Ω			
R27	1800Ω			
R28	68K			
R29	47000 7W	PW10-4700	10W-SQ-4700	
R30	22K			
R31	22K 2W			
R32	2200Ω			
R33	120K			
R34	82K 2W			
R35	33K			
R36	3300Ω			
R37	15K			
R38	120Ω			
R39	39K			(10K) †
R40	18K			
R41	12K			
R42	4.7meg			
R43	220K			
R44	470Ω			
R45	470K			
R46	10K 2W			
R47	3900 1W			
R48	4.7meg			
R49	220K			
R50	470Ω			
R51	470K			
R52	390Ω 1W			
R53	5600Ω			
R54	6800Ω			
R55	47K			
R56	47K			
R57	82K			
R58	39K			
R59	220K			
R60	270K			
R61	33000			
R62	56K			
R63	470K			
R64	4.7meg			
R65	33K			
R66	470K			
R67	39K			
R68	22K			(15K) †
R69	2.2meg			(1.8meg) †
R70	2.2meg			(1.5meg) †
R71	3.3meg			
R72	1meg			
R73	470K			
R74	1.5meg			
R75	220K			
R76	330Ω 1W			
R77	220K			
R78	33K			
R79	3300Ω			
R80	22K			
R81	2.2Ω (Cold)			
R82	1meg			
R83	1meg			
R84	3300Ω			
R85	470K			
R86	47K			
R87	6800Ω 1W			
R88	1200Ω			
R89	100K 5% 1W			
R90	100K			
R91	470K			
R92	100Ω			
R93	47K 7W	PWT-47K	TG-47K	
R94	4700Ω			
R95	33K			
R96	1meg			
R97	1.2Ω 5% ②	PW3-3900	5W-SQ-3900	(4700Ω) *
R99	470Ω 5W ③	PW3-470	5W-SQ-470	
R100	100K 2W			
R101	2700Ω 10W	PW10-2700	10W-SQ-2700	
R102	10Ω			
R103	10Ω			
R104	100K			

① 6800Ω 5% 7W used with VHF Tuner #10677
4700Ω 5% 5W used with VHF Tuner #10672.
2700Ω 5W used with VHF Tuner #10684.
3900Ω 7W used with VHF Tuner #10643.

② Chassis 88-10 uses 8200Ω 5% 7 Watt.
③ 470Ω 2W used in early production chassis.
* Alternate Value
† Value used in TV Chassis 88-10.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: Packard-Bell PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	NOTES
L1	47.25MC Trap	29759 ①	TV-153	6235	RTC-8556	T318	① Part #29757 (Ch. 88-10)
L2	1st Video IF	29755	TV-131	6225	RTC-8556	T318	
L3	2nd Video IF	29585	TV-130	6219	RTC-8551	T217	
L4	3rd Video IF	29585	TV-130	6219	RTC-8551	T217	
L5	41.25MC Trap	29565	TV-152	6235	RTC-8556	T318	
L6A	4th Video IF	29750 ②					② Includes Complete Assy.
B	RF Choke (1uh)		BC-581	4602	RTC-8515	T855	
C	RF Choke (30uh)		TV-192	6152	RTC-8584	T300	
L7	RF Choke (10uh)	29566	MC-586	4612	RTC-8522	T860	
L8	Peaking (250uh)	29509	TV-185	6118	RTC-8588	T315	
L9	4.5MC Trap	29545	TV-151	1470	RTC-8603	T250	
L10	Peaking (650uh)	29713	TV-205	6146	RTC-8592	T326	
L11	Peaking (180uh)	29752 ③	TV-184 ▲	6180 ▲	RTC-8597 ▲	T310 ▲	③ Wound on 6800Ω Res. ▲ Parallel with 6800Ω Resistor
L12	Sound IF	29714	TV-151	1469	RTC-8602	T249	
L13	Ratio Detector	29694	TV-112B	1466-RD	RTC-8080	T237	
L14	RF Choke (12uh)	29646	MC-566	4612	RTC-8523	T861	

COILS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: Packard-Bell PART No.	Merit PART No.	Miller PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	Workman TV PART No.
L15	Horiz. Stabilizer (Hold)	29753	TV-183	6311	RCH10	RTC-8623	H35-7	WLC-25	T103
L16	Width Coil 3-17MH	29718	MWC-11	6329 ①	GRC109 ②	WC-11	WC-28 ③	WLC-6	T 119

① Disregard Tap. ② Drill new mounting hole(s). ③ Use Black and White Terminals.

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	RATINGS: DC RES	RATINGS: INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA: Packard-Bell PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
L17	.240A	35Ω	.9 Hy.	27013A		C-2343		C-34X	

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	REPLACEMENT DATA: Packard-Bell PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	117V ② 2A	540VCT ② 340A DC	5V ④ 3.8A	89076 ①				R-77BC ②	① Alternate Part #89078B. ② Phase and parallel 5A and 8A 6.3V windings. Tape 2A 6.3V winding.
	SEC. 3	SEC. 4	SEC. 5						
	6.3V ⑤ 9.5A								

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: Packard-Bell PART No.	Merit PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	Vert. Output	89529 *					A-115X	
	Vert. Output	89522B †						
T3	Horiz. (15MH) (90°) (Vert. 11MH) Yoke	29718 * or 29716A * 29696 † or 29758A †		PCM-2017 ① ③	DY-24A ① ③ DY-27A ①	Y-50 ① ② Y-52 ②	Y-49 & NW2 Y-60-1	
T4	Horiz. Output	89519C						
	Alt. Horiz. Output	89519D						
	Rear Cover (Yoke)	34103 *						
	Rear Cover (Yoke)	34103 †						

① May require use of new rear cover and centering device.
② Use original yoke damping network if necessary.
③ Remove horizontal damping network; use original.

* Chassis 88-11. † Chassis 88-10.
¢ Chassis 88-10. (Use Pt. #29758A as replacement).

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: Packard-Bell PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	6500Ω	3-4Ω	89515 ①	A-2930	A-3877	24S51	S-3X	① Alternate Part #89515A.
T6	6500Ω	3-4Ω	89515A	A-2930	A-3877	24S51	S-3X	

SPEAKER

ITEM No.	TYPE: SIZE	TYPE: FIELD	TYPE: V. C. IMP	REPLACEMENT DATA: Packard-Bell PART No.	REPLACEMENT DATA: QUAM PART No.	NOTES
SP1	8" x 9"	PM	3-4Ω	83140 ①	69A3	① Used in Model 23K1.
SP2	4"	PM	3-4Ω	83019A ①	4A05	② May be used in some versions of 23K1 for SP3 and SP6
SP3	4"	PM	6-8Ω	83103B ①	4A05Z8	③ Two used in Models 21K3, 23K2.
SP4	6" x 9"	PM	3-4Ω	83140 ①	69A3	④ Used in Model 23C4.
SP5	4"	PM	3-4Ω	83019A ①	4A05	⑤ Used in RM-500 Remote Control.
SP6	4"	PM	6-8Ω	83103B ①	4A05Z8	
	4"	PM	6-8Ω	83100C ②③		
	6" x 9"	PM	3-4Ω	83112B ③	69A3	
	6" x 9"	PM	6-8Ω	83113B ③		
	2½"	PM	3-4Ω	83136 ⑤	25A07	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: Packard-Bell PART No. FUSE	Packard-Bell PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	2½" length of #26 wire							

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: Packard-Bell PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
M2	†	73053	6GC1 †			† AFC Diode, Dual Selenium, Common Cathode Type
M3	1N295 †			1N295 †	1N295 †	† Video Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M4	Tuner	10677	VHF, STANDARD COIL REPLACEMENT GO-4290A (Ch. 88-11)
	Tuner	10672	VHF with UHF Provisions (Ch. 88-11)
	Tuner	10643B	VHF with UHF Provisions (Ch. 88-10)
	Tuner	10684A	VHF (Ch. 88-10)
M5	Circuit Breaker	86718A	

WIRING DATA

High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8235
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

DESCRIPTION	PART NO.	MODEL NO.- 21K3	23K1	23K2	23C4
Safety Glass	55090A	X	X	X	X
Mask	55120	X			
Mask	55154B		X	X	X
Knob-VHF Channel Selector	5233C	X	X	X	
Knob- "	52339				X
Knob-Fine Tuning	52329	X	X	X	
Knob-Fine Tuning (Ebony Cabinet Only)	52358	X	X	X	
Knob-Fine Tuning	52330				X
Knob-Contrast	52257A	X	X	X	X
Knob-On-Off	52330	X	X	X	
Knob-On-Off (Ebony Cabinet Only)	52357	X	X	X	
Knob-Speaker and On-Off	52331				X
Knob-Volume	52332				X
Knob-Brightness	52330				X
Knob- "	52332	X	X	X	
Knob-Brightness (Ebony Cabinet Only)	52355	X	X	X	
Knob-Vertical Hold	52331	X	X	X	
Knob-Vertical Hold (Ebony Cabinet Only)	52353	X	X	X	
Knob-Disc	52352A	X	X	X	
Pointer-Radio Dial	67048	X	X	X	
Glass-Radio Dial	38189-1	X	X	X	
Knob-Radio Tuning	52303	X	X	X	
Knob-Radio Selector	52303	X	X	X	
Knob-Balance, Bass, Treble	52304	X	X	X	
Knob-Loudness, Bass, Treble	52369	X	X	X	
Cabinet-Top (Remote Unit)	21184-2C				X
Cabinet-Bottom (Remote Unit)	21185A				X
Grille-Remote Unit	21186A				X

PACKARD-BELL MODELS 21K3, 23C4, 23K1, 23K2, (Ch. 88-10, 88-11)

FOLDER 1

FM—AM TUNER PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V18	FM RF Amplifier	6BA6	V22	1st FM IF Amp.- AM IF Amp	6BA6
V19	FM Mixer - FM Osc.	12AT7	V23	2nd FM IF Amp. - AM Det.	6AU6
V20	AFC Amp.	6AV6	V24	Left Channel AF Amp. - Right Channel AF Amp.	7025
V21	AM Converter	6BE6			

GENERAL ELECTRIC • RAYTHEON • SYLVANIA •

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Packard-Bell PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C79	2	350	24165	PRS1705	BR245	TC595	TD-2-450	TVA-1701	
C80	5	50	24164	PTT90	NLW5-50	TT50X5	MLV5-50	TE-1303	
C81	40	10	24151	PTT44	NLW40-10	TT15X40	MLV40-10	TE-1119	

FIXED CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	EMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C82	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C83	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C84	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C85	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C86	47		DI-47	DD-470	L10Q47	CCD-470	GP447	10TS-Q47
C87	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C88	1.5	10%	NPO-SI 1.5	TCZ-1R5	C10V15C		CNO-515	10TCC-V15
C89	47		DI-47	DD-470	L10Q47	CCD-470	GP447	10TS-Q47
C90	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C91	10	N330 5%				*		10TCS-Q10
C92	68	NPO 5%		DTZ-68	C10Q68C		CNO-468	10TCC-Q68
C93	1.5-10			829-10				
C94	.05		BPD-05	DD-503	CUB2S5	1DP-2-503	GP150	5HK-S50
C95	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C96	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C97	1.5	10%	NPO-SI 1.5	TCZ-1R5	C10V15C		CNO-515	10TCC-V15
C98	.05		BPD-05	DD-503	CUB2S5	1DP-2-503	GP150	5HK-S50
C99	47		DI-47	DD-470	L10Q47	CCD-470	GP447	10TS-Q47
C100	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C101	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C102	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C103	.005		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C104	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C105	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C106	100		DI-100	DD-101	L10T1	CCD-101	GP310	10TS-T10
C107	.002		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C108	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C109	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C110	100		DI-100	DD-101	L10T1	CCD-101	GP310	10TS-T10
C111	.002		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C112	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C113	27	NPO 10%	NPO-DI 25	TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
C114	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C115	.05		BPD-05	DD-503	CUB6S5	1DP-2-503	GP150	5HK-S50
C116	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C117	220		DI-220	DD-221	L10T22	CCD-221	B-322	10TS-T22
C118	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C119	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C120	.02		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C121	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C122	27	NPO 10%	NPO-DI 25	TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
C123	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C124	.05		BPD-05	DD-503	CUB6S5	1DP-2-503	GP150	5HK-S50
C125	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C126	220		DI-220	DD-221	L10T22	CCD-221	B-322	10TS-T22
C127	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C128	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C129	.02		BPD-02	DD-203	BYB6S2	CCD-203	GP120	5HK-S20
C130	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C131	.001		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R105A	1meg		25095					Loudness, Left Channel
	125K Tap							
B	1meg							Balance, Right Channel
	125K Tap							
C	Switch							Push-Pull (Stereo-Mono)
R106A	1meg		25541	F1-51				Treble, Left Channel
B	1meg			R2-51			▲UE4227	Treble, Right Channel
C	Shaft			Not Req.				
R107A	1meg		25541	F1-51				Bass, Left Channel
B	1meg			R2-51			▲UE4227	Bass, Right Channel
C	Shaft			Not Req.				

▲ "STA-LOC" Equivalent: FA16L, RU16L, OS625, IS1250.

FM–AM TUNER PARTS LIST AND DESCRIPTIONS (Cont'd)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R108	5600Ω 2W			
R109	1000Ω			
R110	68Ω			
R111	3.3meg			
R112	10Ω			
R113	22K			
R114	10K 1W			(18K) *
R115	4.7meg			
R116	1200Ω			
R117	10Ω			
R118	2.2meg			
R119	100Ω			
R120	22K			
R121	10K 1W			
R122	8200Ω 2W			
R123	68Ω			
R124	220K			
R125	220K			

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R126	82K			
R127	33K			
R128	220K			
R129	1meg			
R130	270K			
R131	1800Ω			
R132	220K			
R133	22K			
R134	100K			
R135	33K			
R136	220K			
R137	1meg			
R138	270K			
R139	220K			
R140	22K			
R141	100K			
R142	100K			

* Alternate Value

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Packard-Bell PART No.	REPLACEMENT DATA
K1	Ratio Detector Network	300mmfd, 300mmfd, 300mmfd, .001mfd, 68Ω, 1000Ω, 1500Ω, 6800Ω, 6800Ω, 68K	23627A	Aerovox PA-694 Centralab PC-342 Sprague C-12

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		Packard-Bell PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L18	FM Ant.	29426C					
L19	RF Choke (luh)	29124	BC-561	4602	RTC-8515	T855	
L20	FM RF	29165					
L21	FM Osc.	29243A					
L22	RF Choke (luh)	29124	BC-561	4602	RTC-8515	T855	
L23	1st FM IF	29164	FM-254	1463	RTC-8599	T633	
L24	Loopstick	29364	BC-419	705-A		T532	
L25	AM Osc.	29247B	BC-393	71-OSC	RTC-8648	T510	
L26	1st AM IF	29077	BC-352	12-C1	RTC-8632	T607	
L27	2nd FM IF	29167	FM-254	1463	RTC-8599	T633	
L28	2nd AM IF	29078	BC-353	12-C2	RTC-8633	T608	
L29	Ratio Detector	29084	FM-255	1465	RTC-8600	T635	

PHONO CARTRIDGE & NEEDLES

*NEEDLE LISTINGS SHOWN ARE FOR RESPECTIVE REPLACEMENT CARTRIDGES ONLY.

ITEM No.	REPLACEMENT DATA								NOTES
	Packard-Bell PART No.		ASTATIC PART No.		ELECTRO-VOICE PART No.		SONOTONE PART No.		
	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	
M6	63045	Not Req.	13TBX	Not Req.	26DS	S1-1 * & S3-3 *	8TA4-SD	N-8TA-SD *	

SIGNAL DIODES

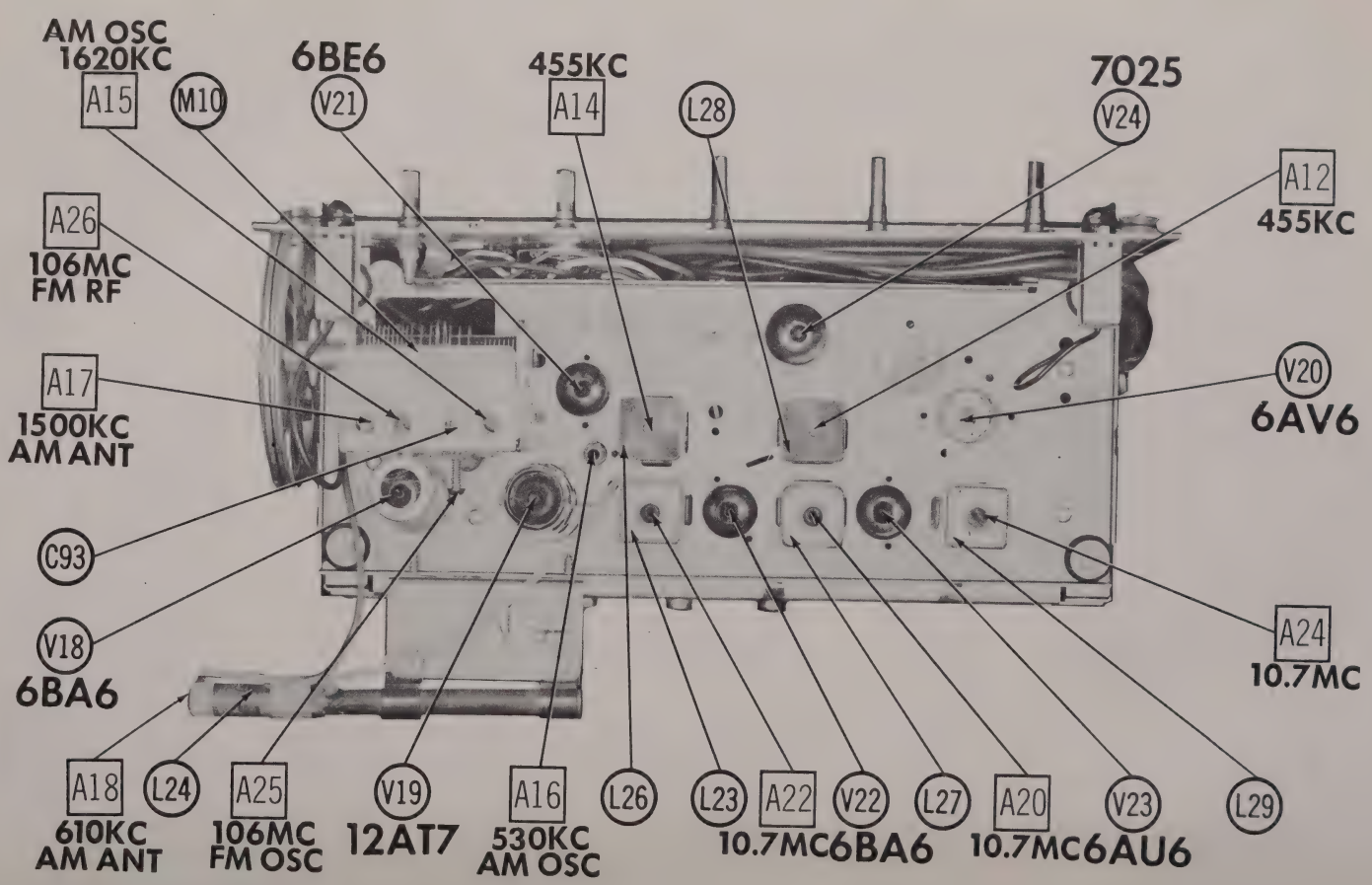
ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Packard-Bell PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M7	1N295	72080		1N295	1N295	AFC, Pigtail
M8	1N541	72027		1N541	1N541	Ratio Detector, Pigtail
M9	1N541	72027		1N541	1N541	Matched Pair

MISCELLANEOUS

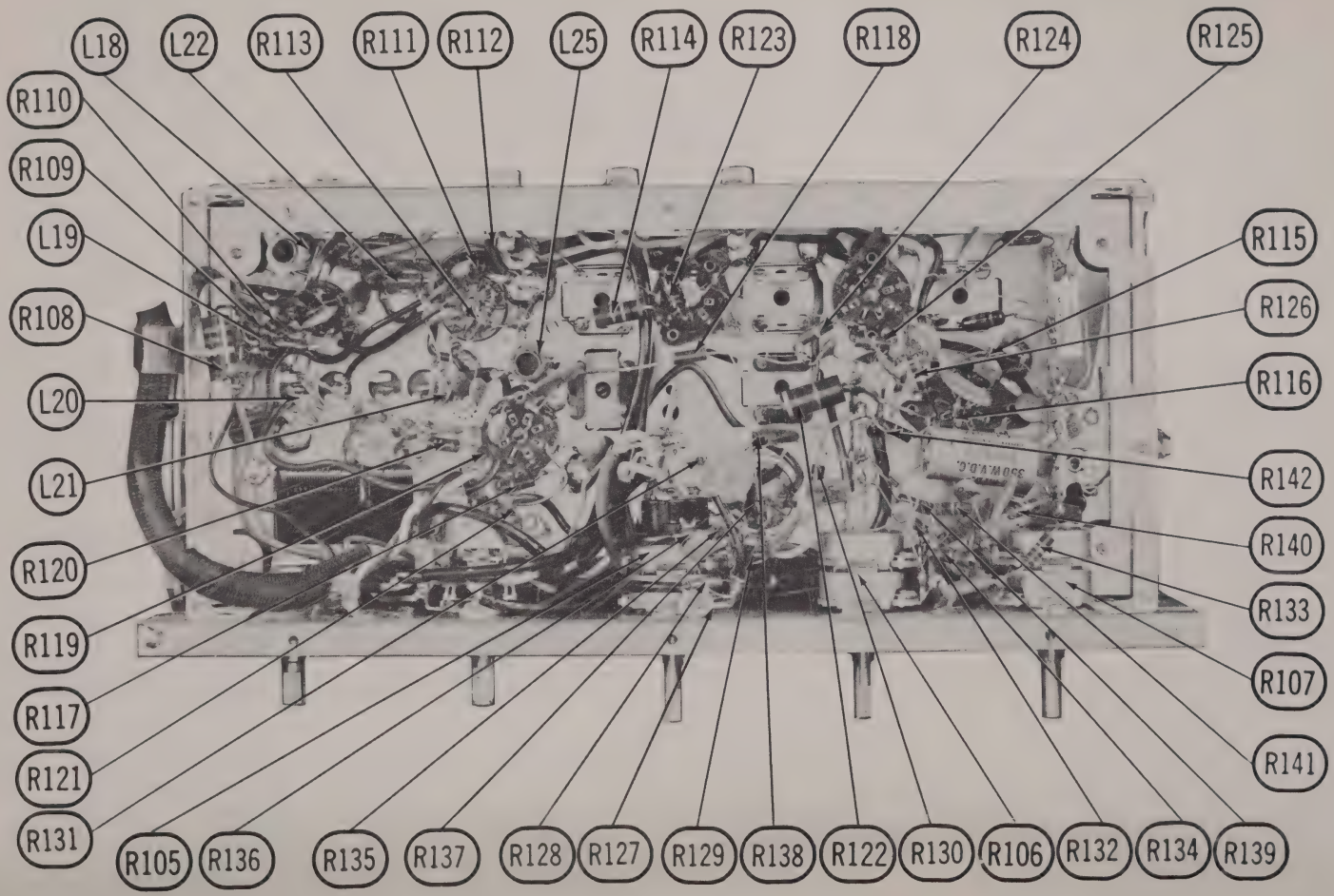
ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M10	Tuning Cap.	23557A	4 Gang (AM Section: Ant. 31-328mmf, Osc. 14-120mmf)
M11	Switch	86089A	Off-On, Function Selector (Rotary Wafer Type)

WIRING DATA

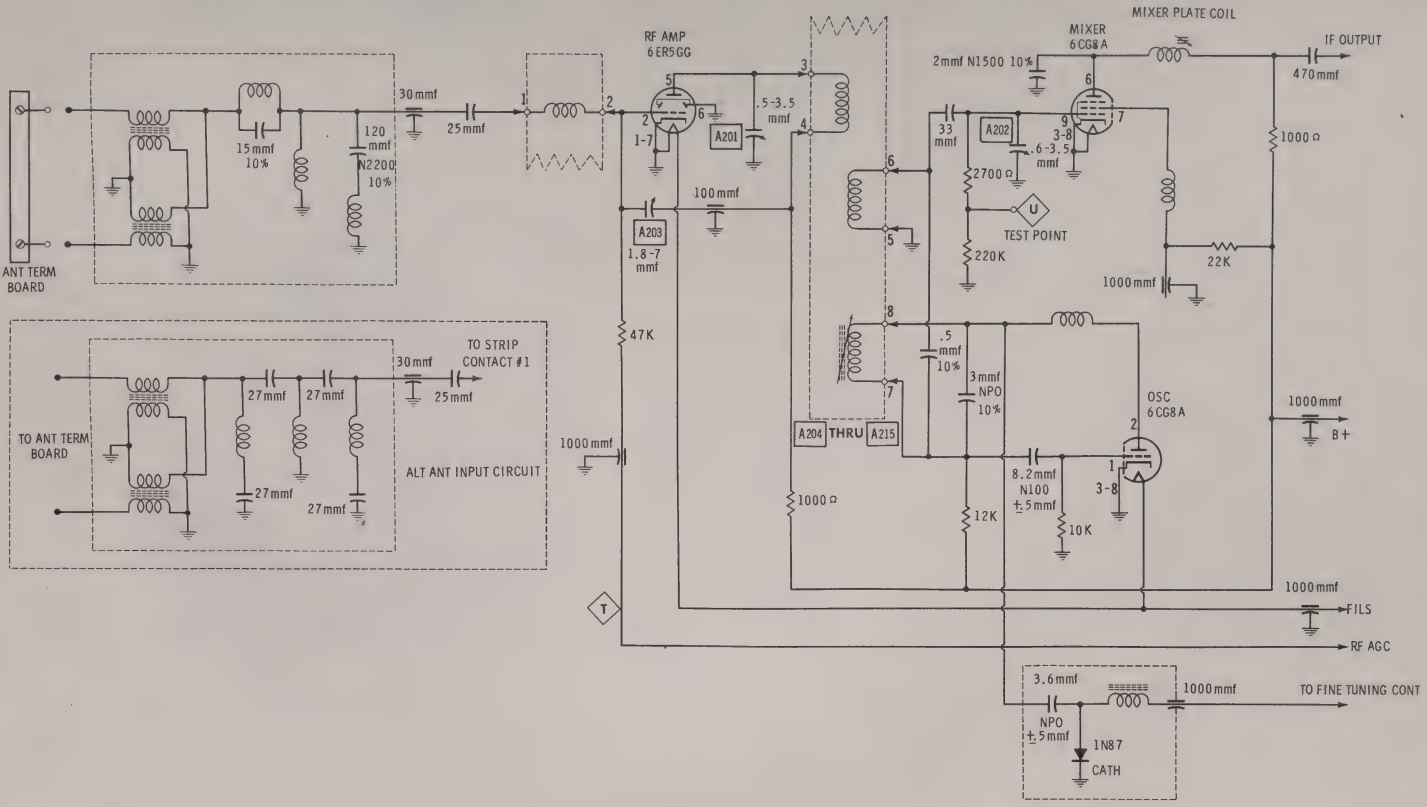
General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Low-Loss Shielded Lead (Interconnecting) .....Use BELDEN No. 8401
Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)



FM-AM TUNER 7TU5 - TOP VIEW



FM-AM TUNER 7TU4 BOTTOM VIEW - RESISTOR, INDUCTOR IDENT.



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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VHF TUNER 10643B

PACKARD-BELL MODELS 21K3, 23C4, 23K1, 23K2 (Ch. 88-10, 88-11)

VHF TUNER PARTS LIST AND DESCRIPTIONS

10677

TUBES

ITEM No.	USE	TYPE (GENERAL ELECTRIC • RAYTHEON • SYLVANIA •)
V201	RF Amp.	6FH5
V202	Mixer - Osc.	6CG8A

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

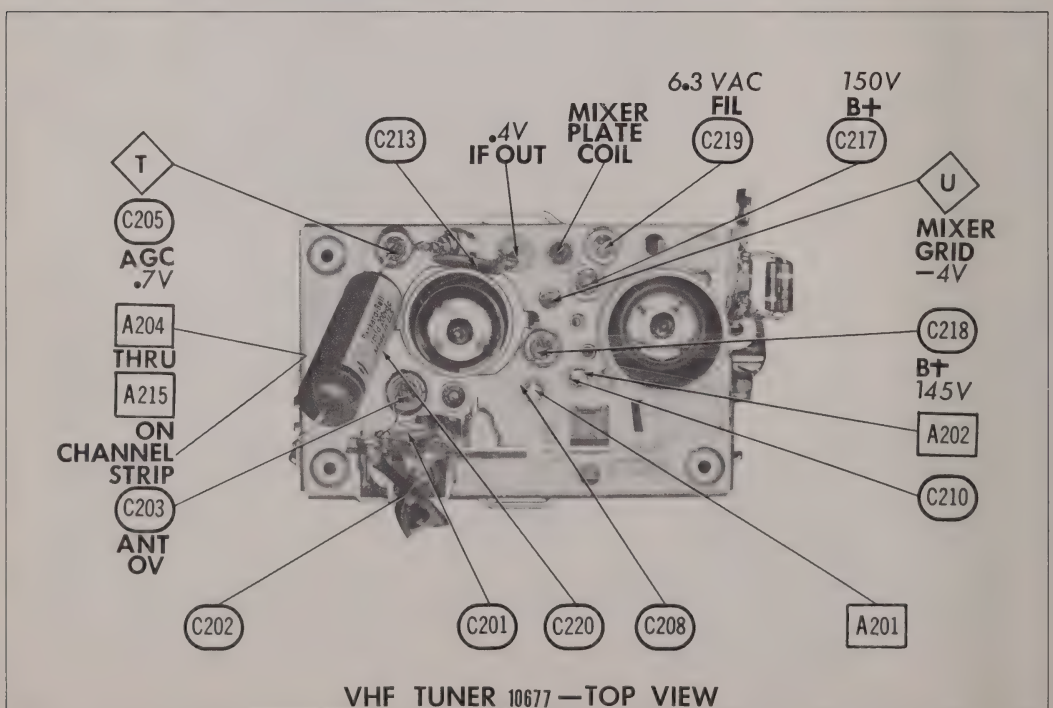
ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	120 N750 10%			TCN-120	C10T12U	CCTN-121	CN7-312	10TCU-T12
C202	15 NPO 10%		NPO-DI 15	DTZ-15	C10Q15C	CCTO-150	CNO-415	10TCC-Q15
C203	30							
C204	28			TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
C205	1000		EF-001	MFT-1000		CCF-102	CT280A	
C206	.5-3.5							
C207	100		EF-0001	MFT-100				
C208	.5-3.5							
C209	33		NPO-DI 33	DTZ-33	C10Q33C	CCTO-330	CNO-433	10TCC-Q33
C210	.5-3.5							
C211	2 N15Q0							
C212	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C213	47 NPO 10%		NPO-DI 47	DTZ-47	C10Q47C	CCTO-470	CNO-447	10TCC-Q47
C214	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C215	7.25							
C216	18 N220					*		10TCR-Q18
C217	1000		EF-001	MFT-1000		CCF-102	CT280A	
C218	1000		EF-001	MFT-1000		CCF-102	CT280A	
C219	1000		EF-001	MFT-1000		CCF-102	CT280A	
C220	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

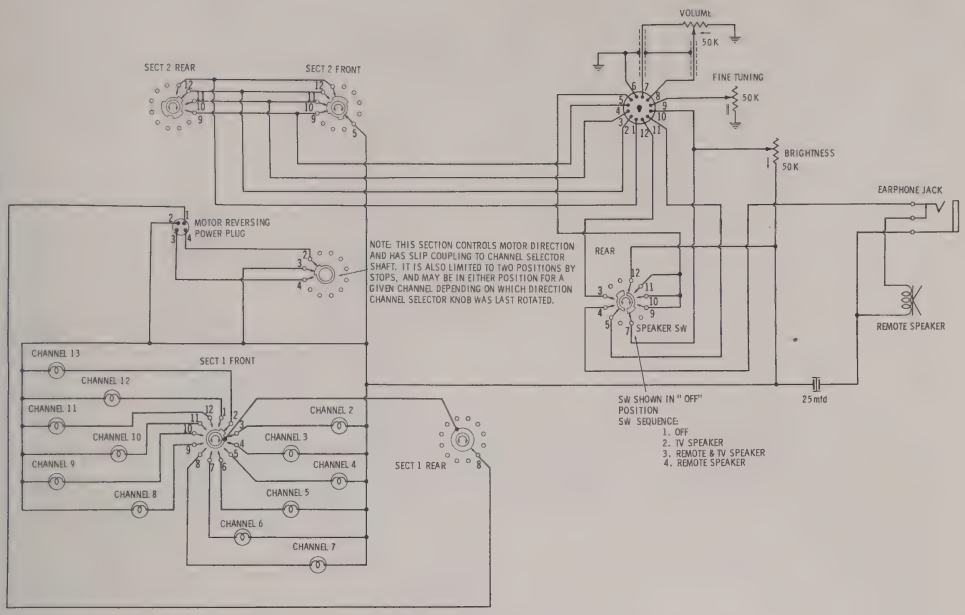
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R201	47K				R205	1000Ω			
R202	1000Ω				R206	4700Ω			
R203	4700Ω				R207	4700Ω			
R204	220K								



VHF TUNER 10677 —TOP VIEW



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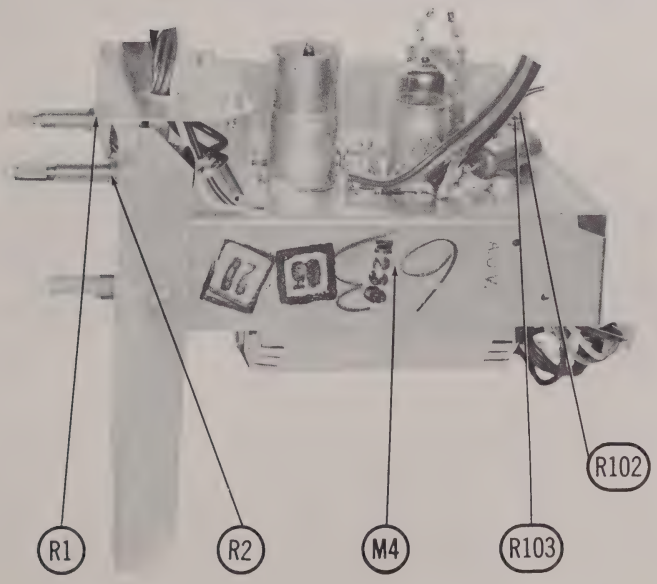
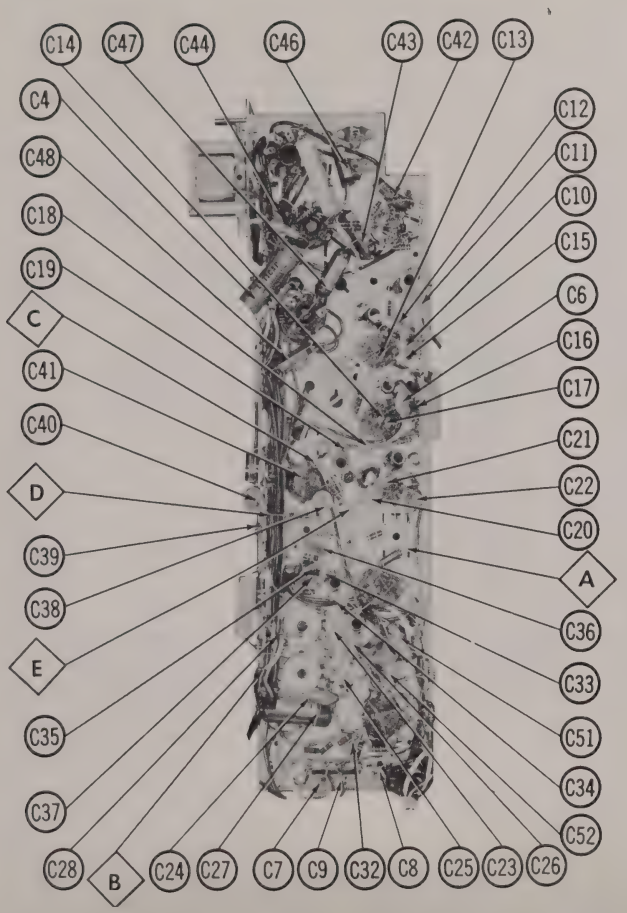
REMOTE CONTROL RM-500



VHF TUNER 10677 - CONTROL BRACKET



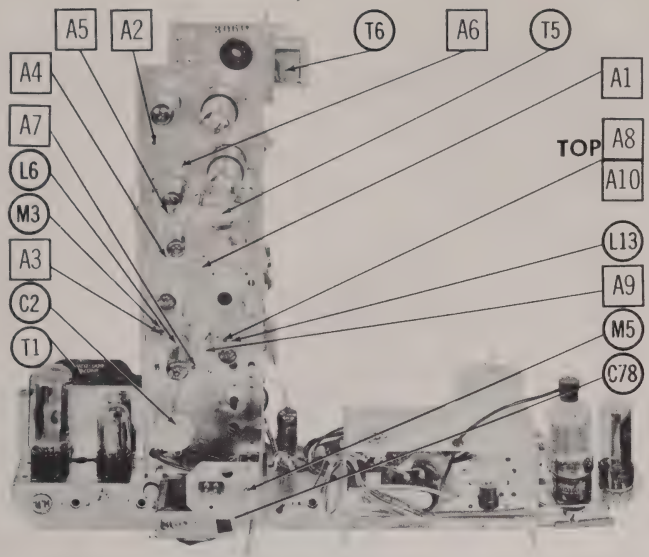
VIDEO, SOUND, SYNC CHASSIS - BOTTOM VIEW
ALIGN., CAPACITOR IDENT.

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ6	68K	56Ω	FIL	FIL	††525Ω	††525Ω	0Ω		
V2	6BZ6	62K	††INF	FIL	FIL	†500Ω	†500Ω	††56Ω		
V3	6CB6A	.1Ω	270Ω	FIL	FIL	†4900Ω	†4900Ω	0Ω		
V4	6EB8	1800Ω	70K	†25K	FIL	FIL	0Ω	2800Ω	†22K	†4000Ω
V5	6EA8	†470K	•48K	†35Ω	FIL	FIL	330K	†3900Ω	0Ω	4.7meg
V6	6AU6	1.2Ω	0Ω	FIL	FIL	†7200Ω	†22K	120Ω		
V7	6AL5	INF	INF	FIL	FIL	24K	0Ω	0Ω		
V8	7025	†220K	4.7meg	470Ω	FIL	FIL	†220K	4.7meg	470Ω	FIL
V9	6V6GT	NC	FIL	†420Ω	†10K	470K	TP	FIL	390Ω	
V10	6V6GT	TP	FIL	†420Ω	†10K	470K	NC	FIL	390Ω	
V11	6EM7	•2.5meg	†840Ω	330Ω	•1.8meg	†•5meg	0Ω	FIL	FIL	
V12	6CG7	†100K	100K	1200Ω	FIL	FIL	†6800Ω	2.4meg	1200Ω	0Ω
V13	6DQ6B	TP	FIL	NC	†47K	540K	NC	FIL	0Ω	TOP CAP †18Ω
V14	6DE4	NC	TP	6meg	NC	†35Ω	TP	FIL	FIL	
V15	1B3GT/ 1G3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP †463Ω
V16	5V3	NC	¶40K	NC	27Ω	NC	29Ω	NC	¶40K	
V17	23AHP4	FIL	22K	Pin 6 •†4.5meg	Pin 10 †1meg	Pin 11 •130K	Pin 12 FIL			
V201	6FH5	0Ω	1.5meg	FIL	FIL	†7800Ω	0Ω	0Ω		
V202	6CG8A	4700Ω	†8600Ω	0Ω	FIL	FIL	†7800Ω	†3900Ω	0Ω	220K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

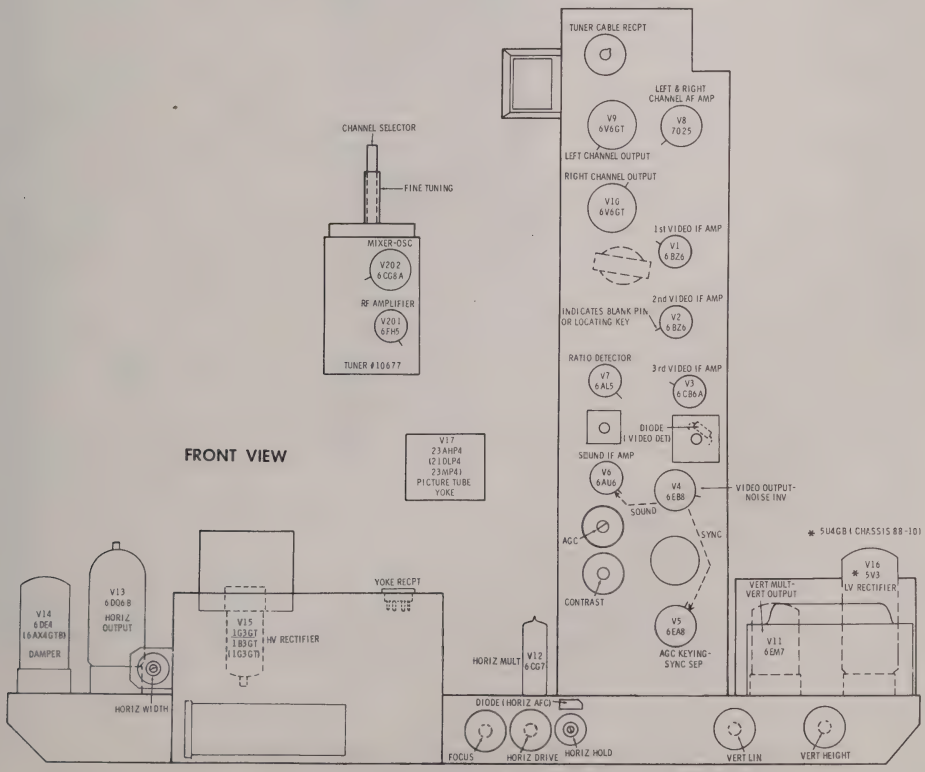
ALL MEASUREMENTS MADE IN "TV" POSITION UNLESS OTHERWISE DESIGNATED.
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
†† MEASURED FROM PIN 2 OF V2.
† MEASURED FROM PIN 2 OF V16.
† MEASURED FROM PIN 3 OF V14.

NC NO CONNECTION
TP TIE POINT

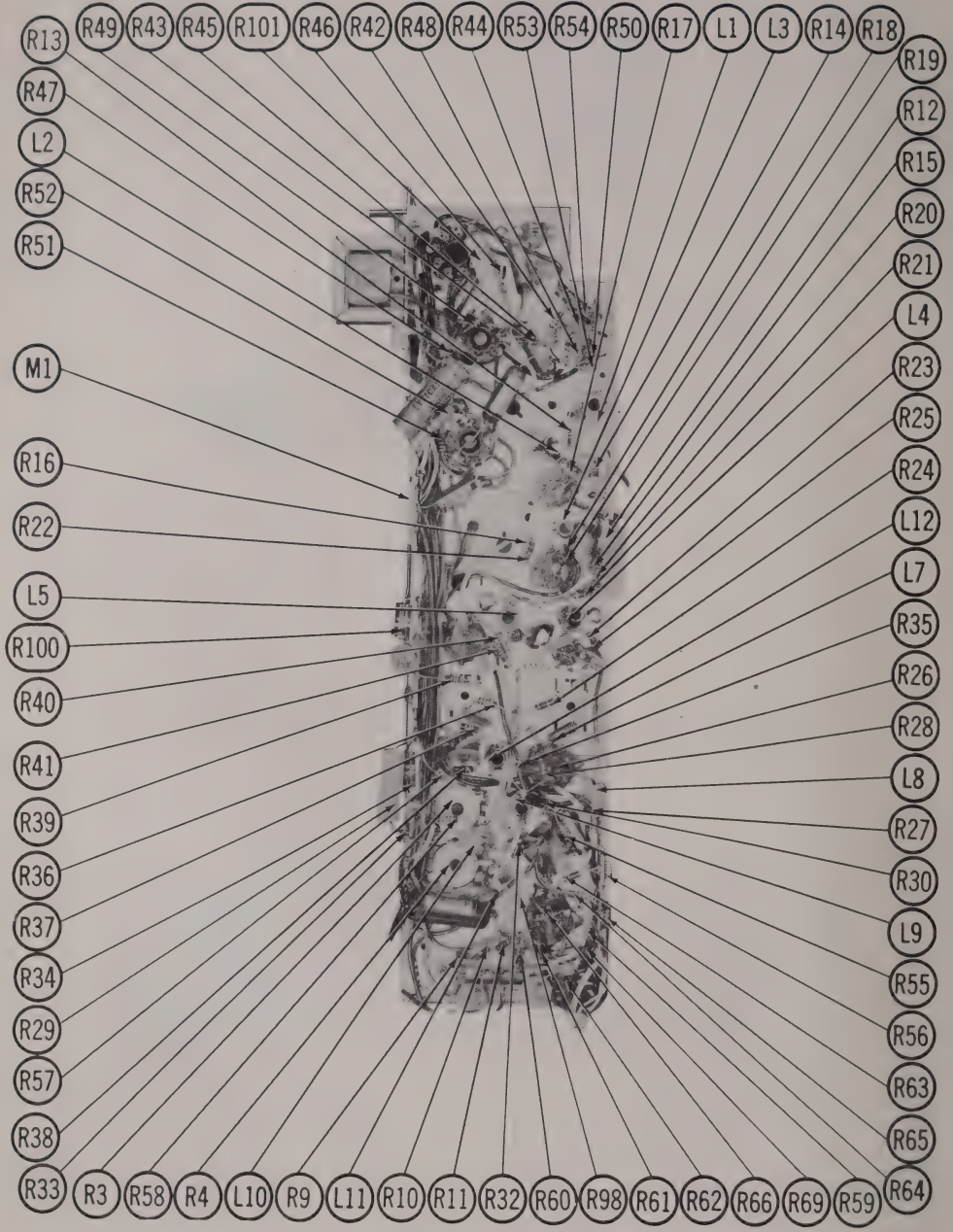
TV RESISTANCE MEASUREMENTS



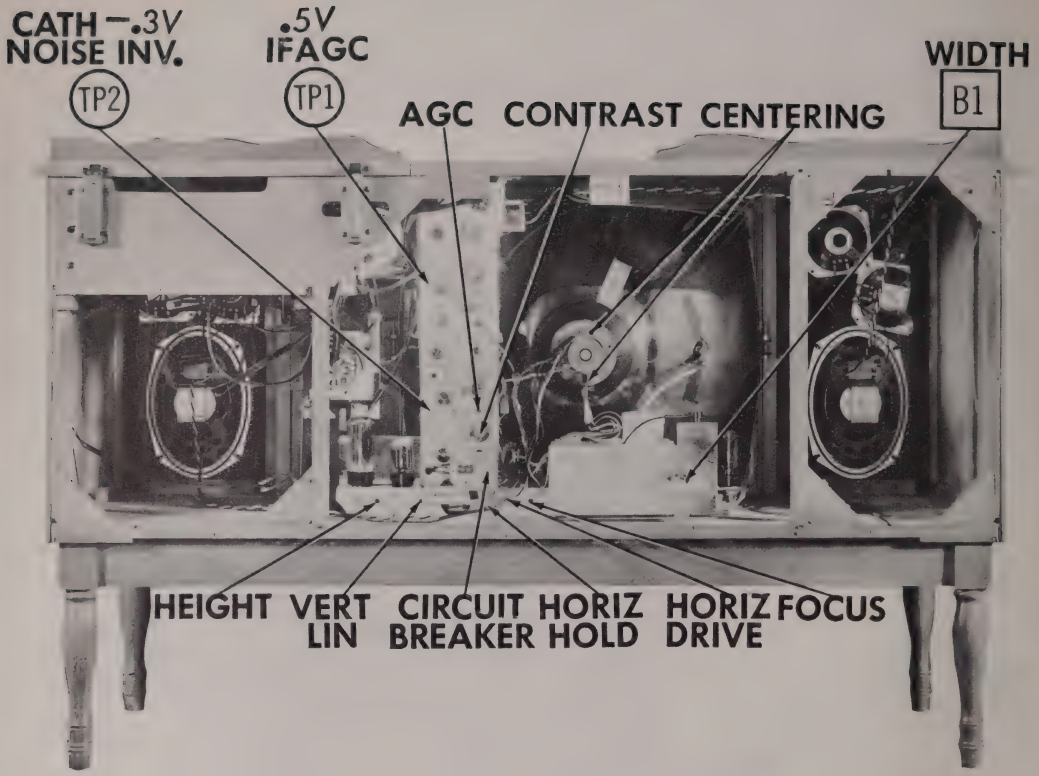
TV CHASSIS–REAR VIEW



TV TUBE PLACEMENT CHART



VIDEO, SOUND, SYNC CHASSIS - BOTTOM VIEW
RESISTOR, INDUCTOR, MISC. IDENT.



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Set the Brightness and Contrast for a normal picture.

Turn the Horizontal Hold (Freq. Slug) clockwise until the picture loses sync. It may be necessary to switch off channel and back again for the picture to lose sync.

Turn the Horizontal Hold slowly counterclockwise until the picture just falls into sync.

Turn to an unused channel. If vertical lines appear near the center of the screen, slowly adjust the Horizontal Drive Control until the white lines disappear.

If the Horizontal Drive was adjusted, tune in a TV station and readjust the Horizontal Hold as above.

Adjust Horizontal Width Slug (B1) for a picture slightly wider than necessary to fill picture mask horizontally.

DISASSEMBLY INSTRUCTIONS

TV CHASSIS REMOVAL - MODEL 23K1

1. Remove 10 wood screws holding rear cover. Disconnect antenna leads and remove rear cover.
2. Disconnect picture tube socket, yoke plug, hi voltage lead and speaker leads.
3. Disconnect phono AC power plug from TV chassis.
4. Remove ground lead from VHF Tuner to TV chassis.
5. Remove 6 knobs at front of cabinet.
6. Loosen 2 screws (at top) holding TV chassis.
7. Remove 3 screws holding VHF Tuner and control bracket assembly; remove channel indicator lamp panel.
8. Disconnect FM-AM Tuner power plug and 2 audio plugs at TV chassis.
9. Remove 2 TV chassis bolts.
10. Remove TV chassis.

PICTURE TUBE REMOVAL

It is necessary to remove the TV chassis for picture tube removal.

PHOTOFACT® Folder with CIRCUITRACE®

SYLVANIA
CHASSIS 546-1, -2, -3, -4

IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

SYLVANIA
CHASSIS 546-1, -2, -3, -4

MODEL 19P11W

SYLVANIA
CHASSIS 546-1, -2, -3, -4

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SET 539 FOLDER 2

SYLVANIA
CHASSIS 546-1, -2, -3, -4

CAUTION

ONE SIDE OF AC LINE CONNECTED TO CHASSIS

Care should be exercised when connecting test equipment or physically contacting chassis. Isolation devices employed by manufacturer should be checked and properly connected before returning receiver to owner.

MODEL 19P11W

TRADE NAME	SYLVANIA	MODELS	CHASSIS	VHF TUNER	UHF TUNER
		19P10B, 19P10G, 19P10W,		323-0117 or	
		19P11T, 19P11W	546-1	323-0133	
		19P10BU, 19P10GU, 19P10WU,		323-0128 or	
		19P11TU, 19P11WU	546-2	323-0134	323-0129
		19T10, 19T11 Series	546-3	323-0136	
		19T10U, 19T11U Series	546-4	323-0137	323-0135

MANUFACTURER	Sylvania Home Electronics, Div. of Sylvania Electric Products Inc., 700 Ellicott St., Batavia, New York
TYPE SET	Television Receiver
TUBES	VHF - Sixteen, UHF - Seventeen
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING VHF - 160 Watts, 1.55 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

SAFETY GLASS

The safety glass is an integral part of the picture tube.

FUSE

A fuse wire is used for filament protection. (For location, see M3 in photo "Chassis - Bottom View".)

FUSE DEVICE

A Circuit Breaker is used for low voltage power supply protection, and may be reset by depressing the reset button. (For location, see "Tube Placement Chart".)

TUNER OSCILLATOR ADJUSTMENT

To touch up the VHF Oscillator, it is necessary to remove the chassis. (See "Disassembly Instructions".)

AGC

The AGC may be varied by means of an AGC Control. (For location, see "Tube Placement Chart".)

FOCUS

The focus may be varied by means of a Focus Control. (For location, see "Tube Placement Chart".)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The Horizontal Frequency Slug is used for the Horizontal Hold. (For location, see "Tube Placement Chart".)

WIDTH

The width may be varied by a Width Control. (For location, see "Tube Placement Chart".)

HORIZONTAL LINEARITY

Linearity is adjusted by coil slug. (See "Tube Placement Chart" for location.)

BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Ratio Detector secondary (All) located at top of chassis.

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

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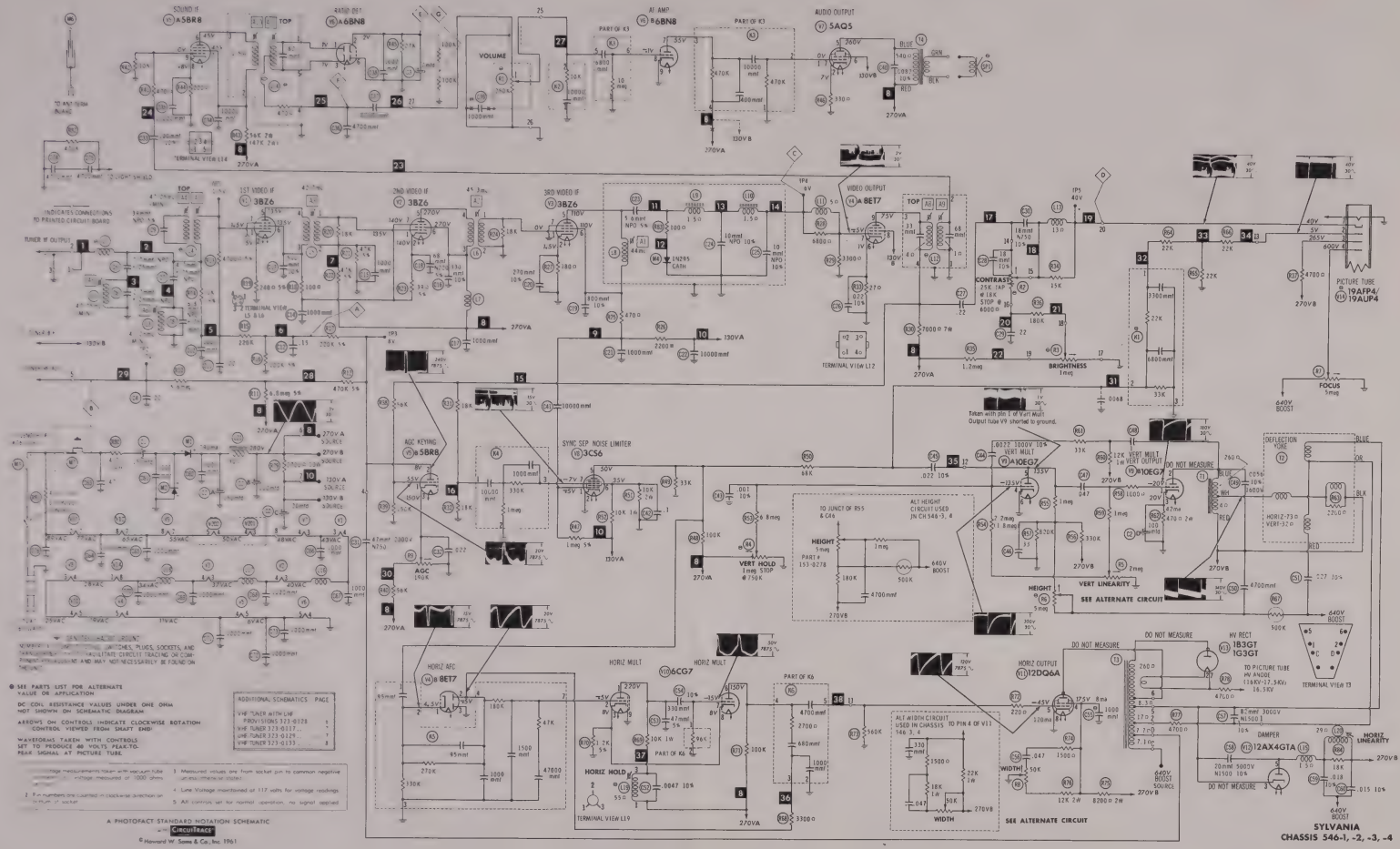
KA737

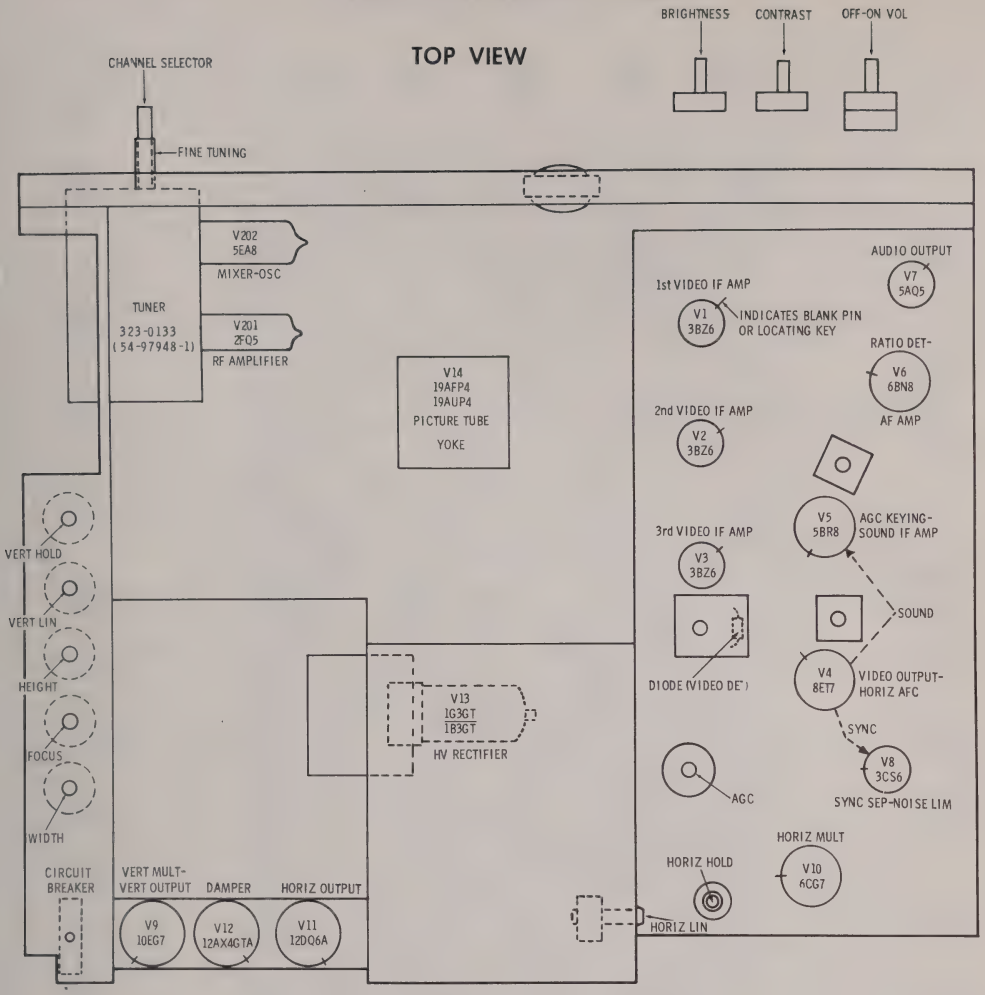
SYLVANIA
CHASSIS 546-1, -2, -3, -4

SYLVANIA
CHASSIS 546-1, -2, -3, -4

SET 539 FOLDER 2


SYLVANIA
CHASSIS 546-1, -2, -3, -4
SOUND IF
6BN8
AUDIO OUTPUT
5AQ5
VOLUME
1ST VIDEO IF
3BZ6
2ND VIDEO IF
3BZ6
3RD VIDEO IF
3BZ6
VIDEO OUTPUT
8ET7
TUNER IF OUTPUT
AGC KEYING
5BR8
SYNC SEP NOISE LIMITER
3CS6
VERT MULT
A10EG7
VERT OUTPUT
A10EG7
CONTRAST
BRIGHTNESS
VERT LINEARITY
HEIGHT
VERT HOLD
HORIZ AFC
8ET7
HORIZ MULT
6CG7
HORIZ OUTPUT
12DQ6A
HV RECT
1B3GT
1G3GT
DAMPER
12AX4GTA
WIDTH
HORIZ HOLD
PICTURE TUBE
19AFP4/
19ALP4
FOCUS
DEFLECTION YOKE
DO NOT MEASURE
SEE ALTERNATE CIRCUIT
TERMINAL VIEW T3
TERMINAL VIEW L19
TERMINAL VIEW L12
TERMINAL VIEW L15 & L16
TO ANTENNA LEAD
270VA
130VA
270VB
130VB
640V BOOST
HORIZ LINEARITY

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

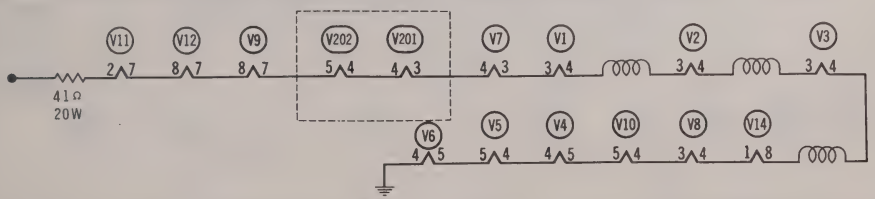
POWER SUPPLY FAILURE
No raster, no sound Fuse Wire, Circuit Breaker, Rectifiers (B+)

SWEEP FAILURE
No raster, has sound V10, V11, V12, V13, V14
No vertical deflection V9
Poor vert. linearity or foldover V9
Poor horiz. linearity or foldover V10, V11, V12
Narrow picture V10, V11, V12, Rectifiers (B+)
Vert. off freq. V9
Horiz. off freq. V4, V10

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, Diode (Video Det.), V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V14
Has pic, no sound V5, V6, V7
Overloaded picture V5

SYNC FAILURE
No vert. sync V8
No horiz. sync V8
No vert. or horiz. sync V4, V8

This receiver employs tubes used in a series filament network, an open filament in any tube will cause the set to be inoperative. (See circuit below.)



SET 539 FOLDER 2

SYLVANIA
CHASSIS 546-1, -2, -3, -4

FOLDER 2

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PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

Use an ISOLATION TRANSFORMER TO PROTECT the Test Equipment.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: GENERAL CEMENT #8282, 8606, 8606L, 9295
WALSCO #2526, 2543, 2544, 2545

VIDEO IF ALIGNMENT

Connect the negative lead of a 3.5 volt bias supply to point (A). Positive to chassis.
Connect the negative lead of a 25 volts bias supply to point (B). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Detune Mixer Plate Coil by turning core fully counterclockwise.

	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	High side thru 4700mmf disc ceramic capacitor to pin 1 (grid) of 1st Video IF. Low side to chassis.	44.0MC (10MC Swp)	42.6MC 45.75MC	Any non-interfering channel	Vert. Amp. to point (C). Low side to chassis.	A1, A2, A3	Adjust for response similar to Fig. 1. A1 controls tilt, A2 controls placement of 45.75MC marker and A3 controls placement of 42.6MC marker.
2.	Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	"	47.25MC	"	"	A4, A5	Detune A5, then adjust A4 for maximum dip at marker. Adjust A5 for maximum dip at marker. (See Fig. 2).
3.	"	"	41.25MC	"	"	A6	Adjust for maximum dip at 41.25MC marker.
4.	"	"	42.6MC 45.75MC	"	"	Mixer Plate Coil, & A7	Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown. If necessary, retouch A1 and A3 SLIGHTLY for desired response.

4.5MC TRAP ALIGNMENT

Set Contrast control fully clockwise, and Brightness control fully counterclockwise.
Connect the negative lead of a 30 volt bias supply to point (A). Positive to chassis.
Connect a 4.5MC series tuned circuit between point (D) and chassis.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5.	High side thru .001mfd to point (C). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	RF probe across coil of 4.5MC series tuned circuit	A8	Adjust for MINIMUM deflection.

ALTERNATE 4.5MC TRAP ALIGNMENT USING ON THE AIR SIGNAL

Tune in a strong TV signal and set Contrast at maximum. Adjust the Fine Tuning until a beat pattern is visible. Adjust A8 for MINIMUM beat interference.

SOUND IF ALIGNMENT

Connect two matched 100K (±1%) resistors in series from point (E) to chassis. The junction of these two resistors is alignment point (G). as shown on the schematic.
Connect the negative lead of a 30 volt bias supply to point (A). Positive to chassis.
Set Contrast control fully clockwise.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6.	High side thru .001mfd to point (C). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe thru 100K to point (E). Common to chassis.	A9, A10	Adjust for maximum deflection.
7.	"	"	"	DC probe to point (F). Common to point (G).	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

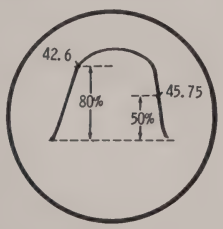


FIG. 1

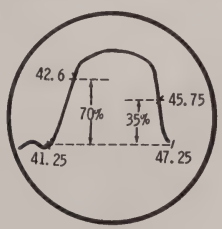
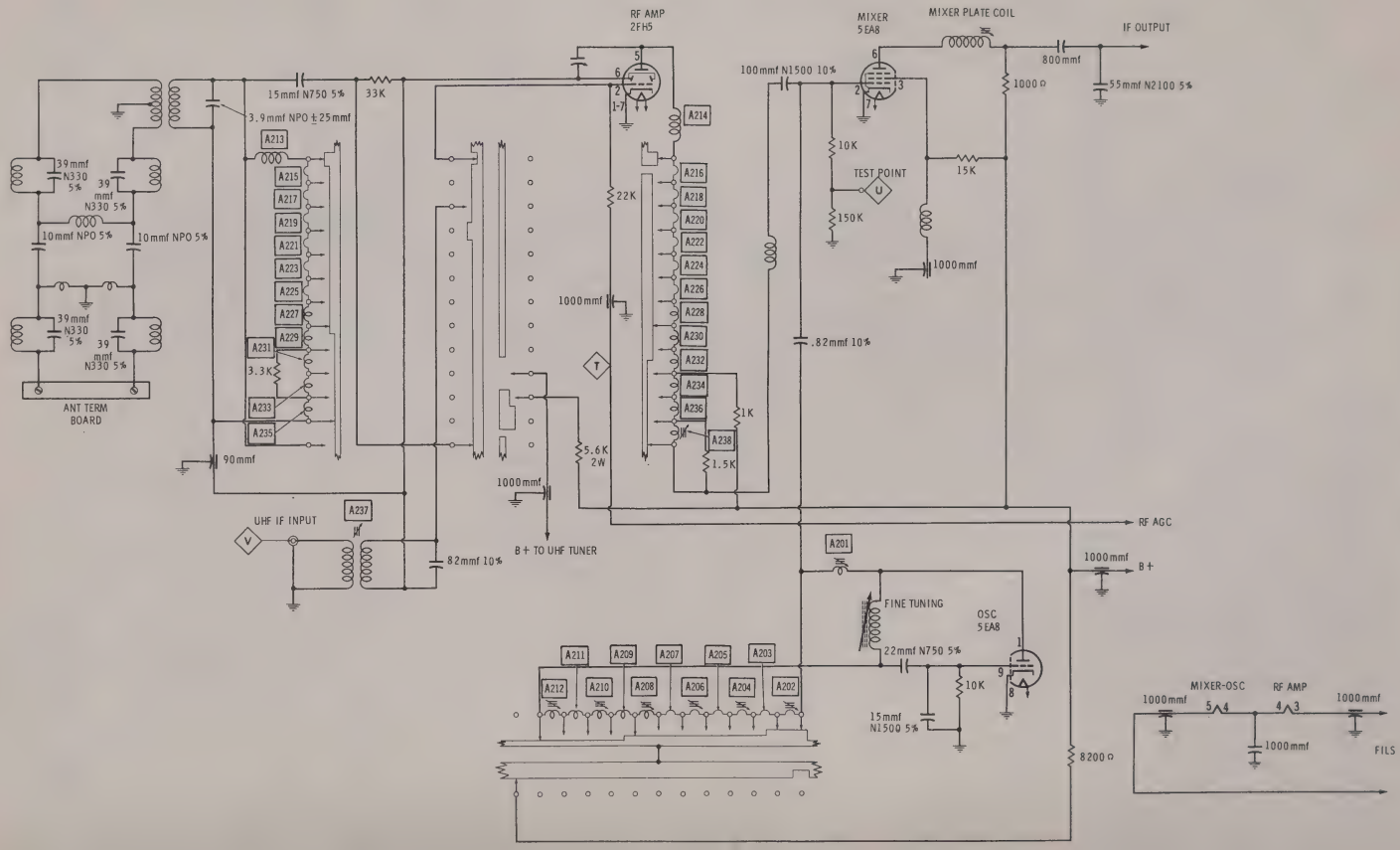


FIG. 2



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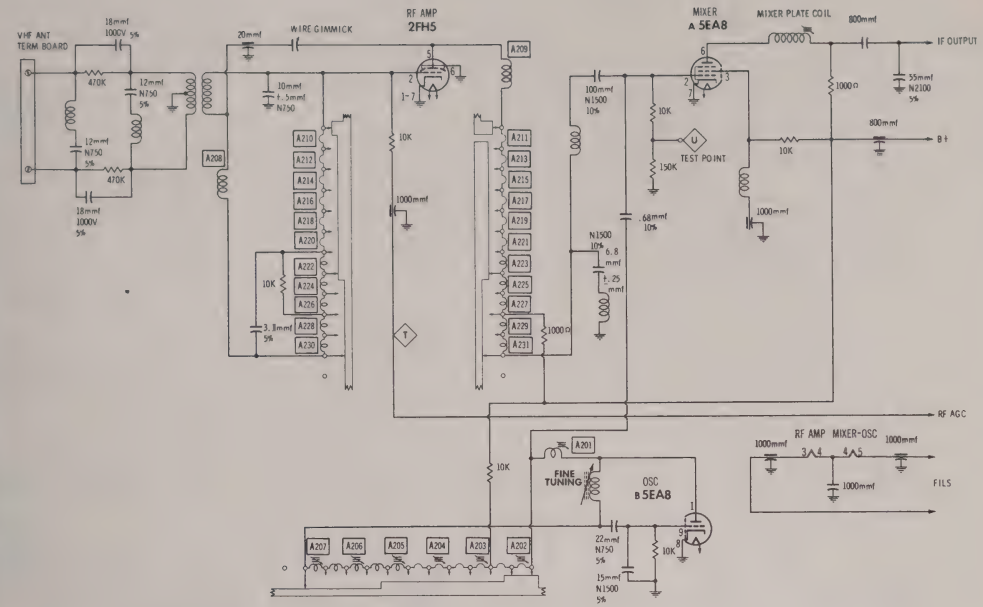
VHF TUNER WITH UHF PROVISIONS 323-0128



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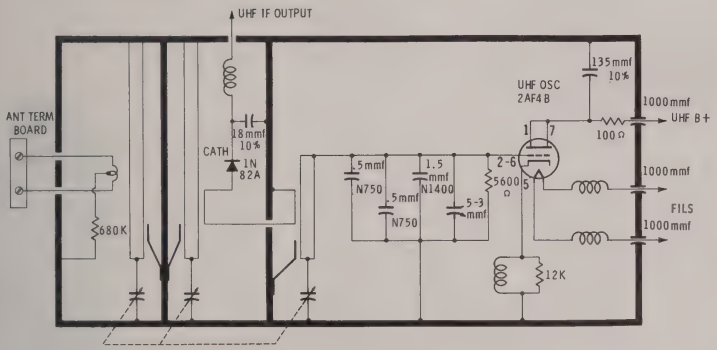
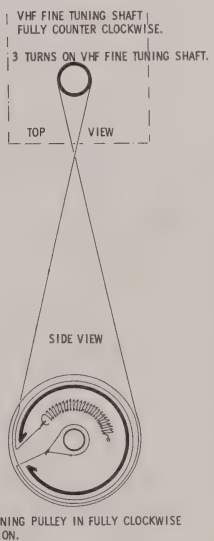
VHF TUNER 323-0117




VHF FINE TUNING SHAFT FULLY COUNTER CLOCKWISE.
3 TURNS ON VHF FINE TUNING SHAFT.
TOP VIEW
SIDE VIEW
UHF TUNING PULLEY IN FULLY CLOCKWISE POSITION.

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UHF TUNER 323-0129 UHF DRIVE CORD STRINGING

VHF TUNER PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	GENERAL ELECTRIC USE	GENERAL ELECTRIC TYPE	ITEM No.	RAYTHEON USE	RAYTHEON TYPE	SYLVANIA USE	SYLVANIA TYPE
V201	RF Amp.	2EQ6	V202	Mixer - Osc.		Mixer - Osc.	5EA8

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	39 NPO 5%			TCZ-39	C10Q39C	CCTO-390	CNO-439	10TCC-Q39
C202	39 NPO 5%			TCZ-39	C10Q39C	CCTO-390	CNO-439	10TCC-Q39
C203	39 NPO 5%			TCZ-39	C10Q39C	CCTO-390	CNO-439	10TCC-Q39
C204	39 NPO 5%			TCZ-39	C10Q39C	CCTO-390	CNO-439	10TCC-Q39
C205	39 NPO 5%			TCZ-39	C10Q39C	CCTO-390	CNO-439	10TCC-Q39
C206	39 NPO 5%			TCZ-39	C10Q39C	CCTO-390	CNO-439	10TCC-Q39
C207	1000		EF-001	MFT-1000		CCF-102	CT280A	
C208	1000		EF-001	MFT-1000		CCF-102	CT280A	
C209	2.2 10%		NPO-SI 2.2	TCZ-2R2	C10V22C	CCTO-2R2	CNO-522	10TCC-V22
C210	15 5%			DTZ-15	C10Q15C		CNO-415	10TCC-Q15
C211	.22 10%	#168-0121						
C212	100 10%		DI-100	DD-101	L10T1	CCD-101	GP1I0	10TS-D10
C213	1.5 10%		NPO-SI 1.5	TCZ-1R5			CNO-515	10TCC-V15
C214	800		BPD-0008	DD-801	L10T8	CCD-801	B-382	10T8-T80
C215	55 N2200 5%	#168-0055				*		
C216	1000		EF-001	MFT-1000		CCF-102	CT280A	
C217	3.9 N150 ±.25mmf	#168-0122				*		
C218	10 NPO 5%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C219	5 ±.5mmf		NPO-DI 5.0	DTZ-4R7	C10V5C	CCTO-050	CNO-547	10TCC-V50
C220	1000		EF-001	MFT-1000		CCF-102	CT280A	
C221	1000		BPD-001	DD-102	BYA10DI	CCD-102	B-320	10TS-D10
C222	1000		EF-001	MFT-1000		CCF-102	CT280A	
C223	1000		EF-001	MFT-1000		CCF-102	CT280A	

Sylvania Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

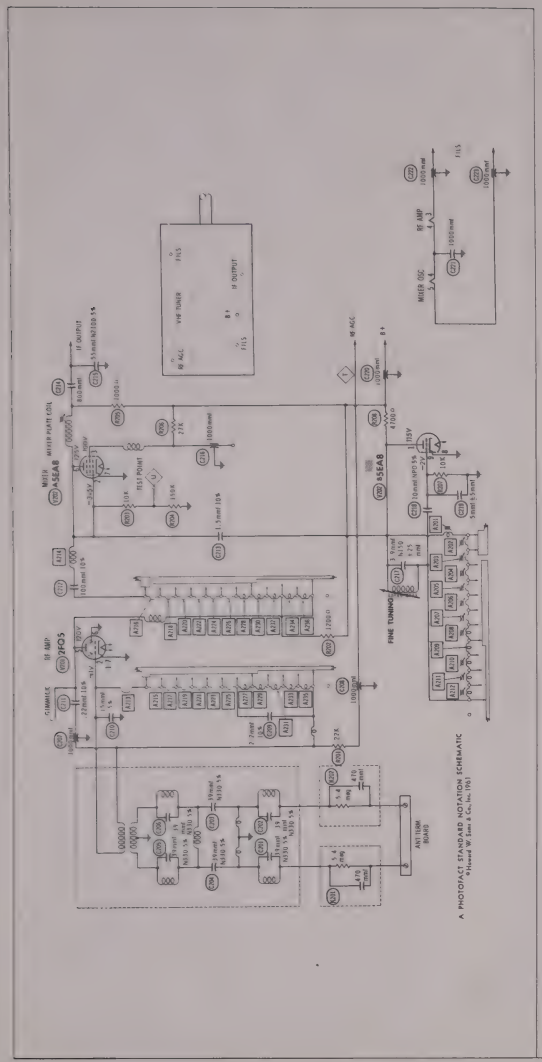
RESISTORS

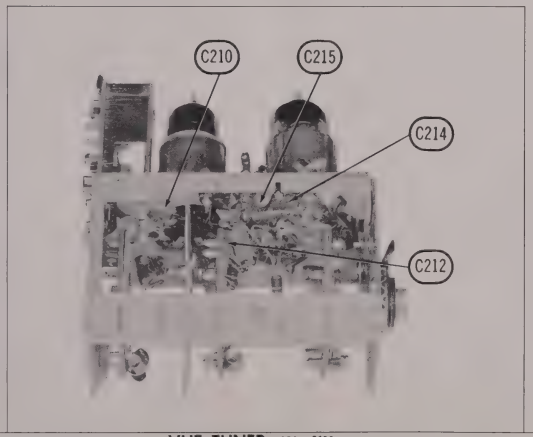
All wattages 1/2 watt, or less, unless otherwise listed.

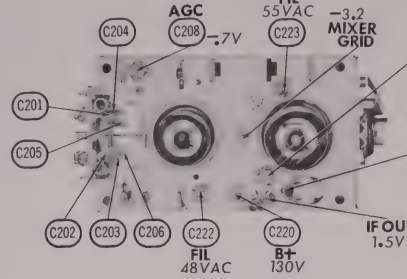
ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	WORKMAN TV PART No.	REMARKS
R201	22K			
R202	1200Ω			
R203	10K			
R204	150K			
R205	1000Ω			
R206	27K			
R207	10K			
R208	4700Ω			

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	SYLVANIA PART No.	REPLACEMENT DATA
K201	Antenna Isolation	470mmf, .5-4meg	190-0035	Centralab RC-471 Sprague ACI-1
K202	Antenna Isolation	470mmf, .5-4meg	190-0035	Centralab RC-471 Sprague ACI-1







SYLVANIA CHASSIS 546-1, -2, -3, -4

FOLDER 2

TUNER ALIGNMENT INSTRUCTIONS

3230128, −0133

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use 10MC sweep unless otherwise noted.
Connect the negative lead of a 2.5 volt bias supply to point ⓘ. Positive to chassis.

	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K across Video Det. Load.	A201	Adjust to place sound marker in trap notch as in Fig. 201. Video marker should fall at 50%.
		207MC	205.25MC 209.75MC	12		A202	
		201MC	199.25MC 203.75MC	11		A203	
		195MC	193.25MC 197.75MC	10		A204	
		189MC	187.25MC 191.75MC	9		A205	
		183MC	181.25MC 185.75MC	8		A206	
		177MC	175.25MC 179.75MC	7		A207	
		85MC	83.25MC 87.75MC	6		A208	
		79MC	77.25MC 81.75MC	5		A209	
		69MC	67.25MC 71.75MC	4		A210	
		63MC	61.25MC 65.75MC	3		A211	
		57MC	55.25MC 59.75MC	2		A212	

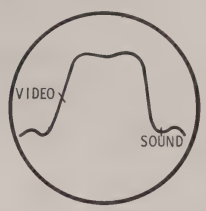


FIG. 201

RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Connect the negative lead of a 2.5 volt bias supply to point ⓘ. Positive to chassis.

	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
2.	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 100K to point ⓘ. Low side to chassis.	A213, A214	Adjust for maximum gain and symmetry of response similar to Fig. 202 with markers as shown.
3.	"	207MC	205.25MC 209.75MC	12	"	A215, A216	
4.	"	201MC	199.25MC 203.75MC	11	"	A217, A218	
5.	"	195MC	193.25MC 197.75MC	10	"	A219, A220	
6.	"	189MC	187.25MC 191.75MC	9	"	A221, A222	
7.	"	183MC	181.25MC 185.75MC	8	"	A223, A224	
8.	"	177MC	175.25MC 179.75MC	7	"	A225, A226	
9.	"	85MC	83.25MC 87.75MC	6	"	A227, A228	
10.	"	79MC	77.25MC 81.75MC	5	"	A229, A230	
11.	"	69MC	67.25MC 71.75MC	4	"	A231, A232	
12.	"	63MC	61.25MC 65.75MC	3	"	A233, A234	
13.	"	57MC	55.25MC 59.75MC	2	"	A235, A236	

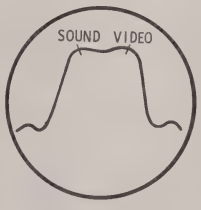


FIG. 202

UHF IF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Connect the negative lead of a 2.5 volt bias supply to point ⓘ. Positive to chassis.

	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	High side thru .001mfd to point ⓥ. Low side to chassis.	44MC (10MC Swp.)	41.25MC 45.75MC	UHF	Vert. Amp. thru 100K across Video Detector Load.	A237, A238	Adjust for maximum gain and symmetry of response similar to Fig. 201 with markers as shown.

TV PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No	• GENERAL ELECTRIC • USE	TYPE	ITEM No	• RAYTHEON • USE	TYPE	ITEM No	• SYLVANIA • USE	TYPE
V1	1st Video IF Amp.	3BZ6	V7	Audio Output	5AQ5			
V2	2nd Video IF Amp.	3BZ6	V8	Sync Sep. - Noise Limiter	3C96			
V3	3rd Video IF Amp.	3BZ6	V9	Vert. Mult. - Vert. Output	10EG7			
V4	Video Output - Horiz. AFC	6ET7	V10	Horiz. Mult.	6CG7			
V5	AGC Keying - Sound IF Amp.	5BR8	V11	Horiz. Output	12DQ6A			
V6	Ratio Det. - AF Amp.	6BN8	V12	Damper	12AX4GTA			
			V13	HV Rectifier	1G3GT,1B3GT			

PICTURE TUBE

ITEM No.	REPLACEMENT DATA: SYLVANIA PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
V14	19AFP4 ④ 19AUP4		19AFP4 ①		19AFP4 ②	① Aluminized ② Silver Screen "85"

▲ Some versions may use 19AUP4 in this application.

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: SYLVANIA PART No.	AEROVOX PART No.	CORNELL DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	150	200	161-1025	PRI-100	XA3015	TC692	TD-150-200	TVAS-1447 *	
C2A	250	350	161-4034	AFH84-53-95		FP430, 38	TMQ-4277	TVL-4534, 2	
B	400	350				TC89	TD-100-450	TVA-1718	
C	20	350							
D	100	25							
C3	1	50	161-1067	PRE100	BBR2-50	TC302	TD-2-50	TVA-1301	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	.22 100V		[illegible] 22		CUB2P22	1DP-3-224	GEM-2022	2TM-P22
C5	2.7 NPO ±.25mmf				C10V3C			10TCC-V27
C6	3.7 NPO ±.25mmf				C10V3C			10TCC-V27
C7	4.7 NPO ±.25mmf		NPO-DI 4.7	DTZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-Y47
C8	6.8 NPO ±.25mmf		NPO-DI 6.8	DTZ-6R8	C10V68C	CCTO-6R8	CNO-568	10TCC-V68
C9	39 NPO 5%			TCZ-39	C10Q39C		CNO-439	10TCC-Q39
C10	1000		BFD1-[illegible]		BY A10DI	CCD-102	B-210	5HK-D10
C11	.22 100V		P288N-22		CUB2P22	1DP-3-224	GEM-2022	2TM-P22
C12	.15 300V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C13	680 10%			DD-511	SR5T51	CCD-501	GP350	10TS-T50
C14	1000		BFD1-[illegible]		BY A10DI	CCD-102	B-210	5HK-D10
C15	1000		BFD1-[illegible]		BY A10DI	CCD-102	B-210	5HK-D10
C16	330 10%			DE-331	L10T33	CCD-331	GP333	10TS-T33
C17	1000		BFD1-[illegible]		BY A10DI	CCD-102	B-210	5HK-D10
C18	68 N330 5%					"		10TCR-Q68
C19	800 10%			DS-801	SR5T8	CCD-801	GP382	10TS-T80
C20	270 10%			DD-271	L10T27	CCD-271	GP327	10TS-T27
C21	1000			BFD1-[illegible]	BY A10DI	CCD-102	B-210	5HK-D10
C22	10000			BFD2-[illegible]	BY B3R3	CCD-103	B-410	5HS-B10
C23	5.6 NPO 5%							10TCC-V56
C24	10 NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C25	10 NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C26	.022 200V 10%		V84C3222-10[illegible]		PM6S22	4DP-2-223	GEM-1612	2TM-S22
C27	.22 400V		P488N-22		CUB4P22	4DP-5-224	GEM-4022	4TM-P22
C28	18		[illegible]		[illegible]	L10Q18	CCD-180	GP418	10TS-Q18
C29	.22 400V		P488N-22		CUB4P22	4DP-5-224	GEM-4022	4TM-P22
C30	18 N750 10%				TCN-18	Q10Q18U		CNT-418	10TCC-Q18
C31	47 2000V N750	#69-0094							
C32	.022 400V		P488N-047	DTZ-223	CUB4S22	4DP-2-223	GEM-4122	GEM-4122
C33	100 10%		1469-0001	TCZ-100	22S1T1	CM-19B-101K	MCB225	MS-310
C34	[illegible]		BFD-01	[illegible]	BY A10SI	CCD-103	B-110	5HK-S10
C35	[illegible]		BFD2-01		BY A10SI	CCD-103	B-110	5HK-S10
C36	4700		BFD2-0047		BY A10D47M	CCD-472	B-247	5HK-D47
C37	10000		BFD2-01		BY A10SI	CCD-103	B-247	5HK-S10
C38	1000		BFD1-001		BY A10DI	CCD-102	B-210	5HK-D10
C39	1000	Note 1	BFD2-001		BY A10DI	CCD-102	B-210	5HK-D10
C40	.0082 600V 10%		P564CM-5082		[illegible]	6DP-2-822	GEM-16282	6PS-D82
C41	1000		BFD2-01	DD-103	BY A10SI	CCD-103	B-110	5HK-S10
C42	.1		P288N-1	DF-104	[illegible]	2DP-3-104	GEM-201	2TM-P10
C43	.001 600V 10%		V84C6D1-10[illegible]	DD-102	[illegible]	6DP-1-102	GEM-1622	6TM-D10
C44	.0032 1000V 10%				DPMS10D32	10DP-2-322	GEM-11622	10TM-D22
C45	.022 400V 10%				PM4S22	4DP-2-223	GEM-1612	4TM-S22
C46	.33 400V				P488N-33	4DP-3-334	GEM-4033	4TM-P33
C47	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C48	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C49	.0056 1000V 10%	#69-0068					GEM-16256	
C50	4700		BFD-0047	DD-472	BY A10D47M	CCD-472	B-247	5HK-D47
C51	.027 600V 10%		P564CM-027		DPM5S27	6DP-3-273	GEM-1613	6PS-S27
C52	.0047 600V 10%		V84C6D47-10[illegible]		PM6D47	6DP-1-472	GEM-16247	6TM-D47
C53	47 5%	TCZ-47	1469-000047	TCZ-47	22S1Q47	CM-19B-470K	CNO-447	MS-447
C54	330 10%		1469-00033		19S1T33	CM-19B-331K	MCB241	MS-333
C55	1000	Note 2	BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C56	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C57	53 3000V N1500 10%	#69-0061						
C58	20 5000V N1500 10%	#69-0124						
C59	.068 600V 10%		P564CM-068		PM6S2	6DP-2-203	GEM-1612	6TM-S20
C60	.015 600V 10%		V84C6S3-10[illegible]		[illegible]	6DP-2-153		6TM-S15
C61	1000		BFD-001	[illegible]	BY A10DI	CCD-102	B-210	5HK-D10
C62	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C63	.47 400V		P488N-47		CUB4P47	4DP-5-474	GEM-2047	4TM-D47
C64	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C65	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C66	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10

FIXED CAPACITORS (cont)

ITEM No	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C67	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C68	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C69	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C70	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C71	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C72	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C73	1000		BFD-001	DD-102	BY A10DI	CCD-102	B-210	5HK-D10
C74	4700		BFD-0047	DD-472	BY A10D47M	CCD-472	B-247	5HK-D47
C75	4700		BFD-0047	DD-472	BY A10D47M	CCD-472	B-247	5HK-D47
C76	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
Note 1. May not be used in some versions. # Sylvania Part Number
Note 2. Models 19T10, 19T11 (Chassis 546-3, -4) use 330mmf in this application.

CONTROLS

ITEM No.	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: SYLVANIA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	250K	½	153-0255 ①	B-51	A47-250K-Z	QL3-130	U44	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KR-1	SWE-12	78-1	US-26	Power Off-On
R2	25K 15K Tap	½	153-0254 ②					Contrast
R3A	1meg	½	153-0256 ③	B-69	A47-1meg-S	QL1-137	U54	Brightness
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R4A	1meg 750K Stop	½	153-0273 ④	T7-56	B47-1meg-S	BL1-136	PTA754L	Vert. Hold
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R5	2meg	½	153-0271	T7-75	B47-2meg-S	HLC-1	PTA36L	Vert. Linearity
R6	5meg	½	153-0264 ⑤	T7-87	B47-5meg-S	HLC-5	PTA56L	Height
R7	5meg	½	153-0267	T7-87	B47-5meg-S	HLC-5	PTA56L	Focus
R8A	50K	½	153-0236	T7-31	B47-50K-S	BU-123	PTA54L	Width
B	Shaft			Not Req.	Not Req.	TM4	Not Req.	
R9	100K	½	153-0179					AGC

① Chassis 546-3 uses Volume Control (Part #153-0274) and Off-On Switch (Part #571-0046). Chassis 546-4 use Part #152-0061.
② Chassis 546-3, 4 use Part #153-0275. ④ Chassis 546-3, 4 use Part #153-0276.
③ Chassis 546-3, 4 use Part #153-0244. ⑤ Chassis 546-3, 4 use Part #153-0278.
* Use 320K Resistor in series with right hand terminal, viewed shaft end terminals down.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No	WORKMAN TV PART No.	REMARKS
R10	5.6meg			
R11	6.8meg 5%			
R12	470K 5%			
R13	470Ω 5%			
R14	1000Ω 5%			
R15	220K			
R16	100K 5%			
R17	220K 5%			
R18	100Ω			
R19	240Ω 5%			
R20	18K			
R21	47K 5%			
R22	47K 5%			
R23	39Ω 5%			
R24	18K			
R25	470Ω			
R26	2200Ω			
R27	180Ω			
R28	5600Ω			
R29	5600Ω			
R30	7000Ω 7W	PW10-7000	7G-7000	
R31	18K			
R32	18K			
R33	27Ω			
R34	15K			
R35	1.2meg			
R36	180K			
R37	4700Ω			
R38	56K			
R39	150K			
R40	56K			
R41	470Ω			
R42	10K			
R43	56K 2W			(47K 2W) *
R44	220Ω			
R45	27K			
R46	330Ω			
R47	1meg 5%			

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No	WORKMAN TV PART No.	REMARKS
R48	100K			
R49	33K			
R50	68K			
R51	10K 2W			
R52	10K 1W			
R53	6.8meg			
R54	2.2meg			(1.8meg) *
R55	1meg			
R56	330K			
R57	820K			
R58	1000Ω			
R59	1meg			
R60	12K 1W			
R61	33K			
R62	470Ω 2W			
R63	2200Ω			
R64	22K			
R65	22K			
R66	22K			
R67	500K			#189-0081
R68	3300Ω			
R69	10K 1W			
R70	1200Ω 5%			
R71	100K			
R72	2200			
R73	560K			
R74	1500Ω			
R75	8200Ω 2W			
R76	12K 2W			
R77	4700Ω			
R78	4700Ω			
R79	2700Ω 10W	PW10-2700	10W-SQ-2700	
R80	6.7Ω 10W			#185-0007
R81	41Ω 20W	PW20-41	20W-SQ-41	
R82	470K			
R83	100Ω			
R84	18K			

\# Sylvania Part Number
* Value used in Chassis 546-3, -4.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: SYLVANIA PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	NOTES
L1	RF Choke	119-0025 ①					① Not used in Chassis 546-3, -4.
L2	47.25MC Trap	119-0026					
L3	41.25MC Trap	120-0027					
L4A	1st Video IF	119-0029 ②					② Part #119-0027 used in Chassis 546-3, -4.
B	47.25MC Trap						
L5	2nd Video IF	119-0028					
L6	3rd Video IF	119-0028					
L7	RF Choke (1.8uh)	119-0032	BC-581	4602	RTC-8515	T855	
L8	4th Video IF	119-0026					

COILS (RF-IF) (cont)

ITEM No.	USE	REPLACEMENT DATA: SYLVANIA PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	NOTES
L9	RF Choke (10uh)	119-0030	BC-586	4612	RTC-8522	T860	
L10	RF Choke (10uh)	119-0030	BC-586	4612	RTC-8522	T860	
L11	Peaking (68uh)	131-3036	TV-103	6173	RTC-8590	T339	
L12A	4.5MC Trap	120-0023 ③					③ Includes 4.7, 33, & 68mmf Capacitors.
B	Sound Takeoff						
L13	Peaking (305uh)	131-2037	TV-301	6134	RTC-8578	T350	
L14	Ratio Detector	127-0002 ④					④ Includes 4700 5% Res. & 82mmf Capacitor.
L15	RF Choke (3uh)	119-0010	BC-586	4612	RTC-8522	T860	
L16	Fil. Choke (1.2uh)	119-0032	BC-581	4602	RTC-8515	T855	
L17	Fil. Choke (1.2uh)	119-0032	BC-581	4602	RTC-8515	T855	
L18	Fil. Choke (1.2uh)	119-0032	BC-581	4602	RTC-8515	T855	

COILS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: SYLVANIA PART No.	Merit PART No.	Miller PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	Workman TV PART No.
L19	Horiz. Stabilizer	132-0023 ①							
L20	Horiz. Linearity	132-0027	MWC12	6315	QRC-104	WC-18A	WC-14	WLC-13	

① Part #132-0022 used in Chassis 546-3, -4.

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	DC RES.	INDUCTANCE @ CURRENT 1000 ~	REPLACEMENT DATA: SYLVANIA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
L21	.290A	30Ω	.9 Hy.	146-0030		C-2343	26C44	C-343X	

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: SYLVANIA PART No.	Merit PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	Vert. Output	241-0047						
T2	Yoke (Horiz. 34MH, 110° (Vert. 30.5MH, Rear Cover and Centering Device	110-0041	MDF-110		DY-42A ①	Y-46	Y-66-1	
		400-0041						
	Yoke Clamp	487-0075						
T3	Horiz. Output	241-0052						

① Requires new rear cover and centering device.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: SYLVANIA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T4	12K	3-4Ω	143-0095				S-11Z	

SPEAKER

ITEM No.	TYPE: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: SYLVANIA PART No.	QUAM PART No.	NOTES
SP1	3" x 5"	PM	3-4Ω	539-3501 *	35A05	* Used in Models 19T10, 19T11 (Chassis 546-1, -2)
	3" x 5"	PM		539-3500 †		† Used in Models 19T10, 19T11 (Chassis 546-3, -4)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	SYLVANIA PART No.	REPLACEMENT DATA
K1	Vert. Blanking	3300mmf, 6800mmf, 22K, 33K	190-0059 * (32-95186-1)	
K2	AF Amp. Grid	10000mmf, 10K	190-0072	
K3	Audio Coupling	4000mmf, 6800mmf, 10000mmf, 470K, 470K, 10meg	190-0058 (32-95184-1) or (32-95187-1)	
K4	Sync Sep. Grid	1000mmf, 10000mmf, 330K, 1meg	190-0041 (32-88098-2) or (32-95133-2)	Centralab PC-391
K5	AFC Network	95mmf, 95mmf, 1000mmf, 1500mmf, 47000mmf, 47K, 180K, 270K, 330K	190-0062 (32-97803-2)	
K6	Horiz. Mult. Plate	680mmf, 1000mmf, 4700mmf, 27000, 56K	190-0061 (32-97784-1) or (32-97789-1)	

* Alternate K1-Pt. #190-0059 (32-95727-1). 6800mmf connected externally in some versions.

POWER RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: SYLVANIA PART No.	RCA PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.290A	517-0021	1N1763	40H	SR500	
M2	.290A	517-0021	1N1763	40H	SR500	

SYLVANIA CHASSIS 546-1, -2, -3, -4

FOLDER 2

TV PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			SYLVANIA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M3	1" length of #26 wire							

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		SYLVANIA PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M4	1N295			1N295	1N295	Video Detector, Pigtail

MISCELLANEOUS

ITEM No.	PART NAME	SYLVANIA PART No.	NOTES
M5	Tuner	323-0133 or 323-0117	(54-97948-1) VHF, Chassis 546-1 (54-95757-3) VHF , Chassis 546-1
	Tuner	323-0128 or 323-0134	(54-95757-6) VHF with UHF Provisions, Chassis 546-2 (54-97948-2) VHF with UHF Provisions , Chassis 546-2
	Tuner	323-0129	(54-88853-3) UHF, Chassis 546-2
	Tuner	323-0136	(54-97947-3) VHF, Chassis 546-3
	Tuner	323-0137	(54-97947-4) VHF with UHF Provisions, Chassis 546-4
	Tuner	323-0135	(54-89843-3) UHF, Chassis 546-4
M6	Antenna		JFD Replacement Part #TA-408
M7	Circuit Breaker	191-0026	

WIRING DATA

High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

DESCRIPTION	PART NO.	MODEL NO. 19P10W, WU	19P10G, GU	19P11W, WU	19P11T, TU	19T10, U	19T11, U
Knob- VHF Channel Selector VHF Models Only	743-0119	X					
Knob- "	743-0121		X				
Knob- "	743-0120			X	X		
Knob- "	740-0468					X	
Knob- "	740-0469						X
Knob- Channel Selector VHF UHF Models	743-0122	X					
Knob- "	743-0124		X				
Knob- "	743-0123			X	X		
Knob- "	740-0468					X	
Knob- "	740-0469						X
Knob- Fine Tuning, VHF-UHF Models	740-0422	X	X	X	X		
Knob-Fine Tuning, VHF Models	740-0426	X	X	X	X		
Knob- "	740-0471					X	
Knob- "	740-0473						X
Knob- Volume, Brightness, Contrast	740-0424	X					
Knob- "	740-0425		X				
Knob- "	740-0423			X	X		
Knob- Brightness, Contrast, Vert. Hold	740-0474					X	X

DESCRIPTION	PART NO.	MODEL NO. 19P10W, WU	19P10G, GU	19P11W, WU	19P11T, TU	19T10, U	19T11, U
Knob-Vertical Hold	740-0420	X	X	X	X		
Knob- "	740-0474					X	X
Knob-Horizontal Hold	740-0428	X	X	X	X		
Knob-AGC	740-0421	X	X	X	X		
Handle	818-0369	X					
Handle	818-0370		X				
Handle	818-0368			X	X		
Handle	818-0377					X	
Handle	818-0378						X
Mask	716-0078					X	X
Window-Channel Indicator	722-0097					X	X
Knob- Volume, UHF Channel Selector	740-0470					X	
Knob- "	740-0472						X
Dial-UHF Channel Indicator	722-0095					X	X
Dial- VHF Channel Indicator VHF Models Only	722-0091					X	
Dial- "	722-0093						X
Dial- Channel Indicator UHF-VHF Models	722-0092					X	
Dial- "	722-0094						X

TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS 323-0117

Use an ISOLATION TRANSFORMER TO PROTECT the Test Equipment.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VHF OSCILLATOR ALIGNMENT

Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Across VHF Antenna Terminals with 120Ω in each lead.	213MC	215.75MC	13	Across Video Det. Load with 10K in Vert. Amp. Lead.	A201	Adjust to place marker in trap notch as in Fig. 201.
2.	"	207MC	209.75MC	12	"	A202	"
3.	"	195MC	197.75MC	10	"	A203	"
4.	"	183MC	185.75MC	8	"	A204	"
5.	"	85MC	87.75MC	6	"	A205	"
6.	"	69MC	71.75MC	4	"	A206	"
7.	"	57MC	59.75MC	2	"	A207	"

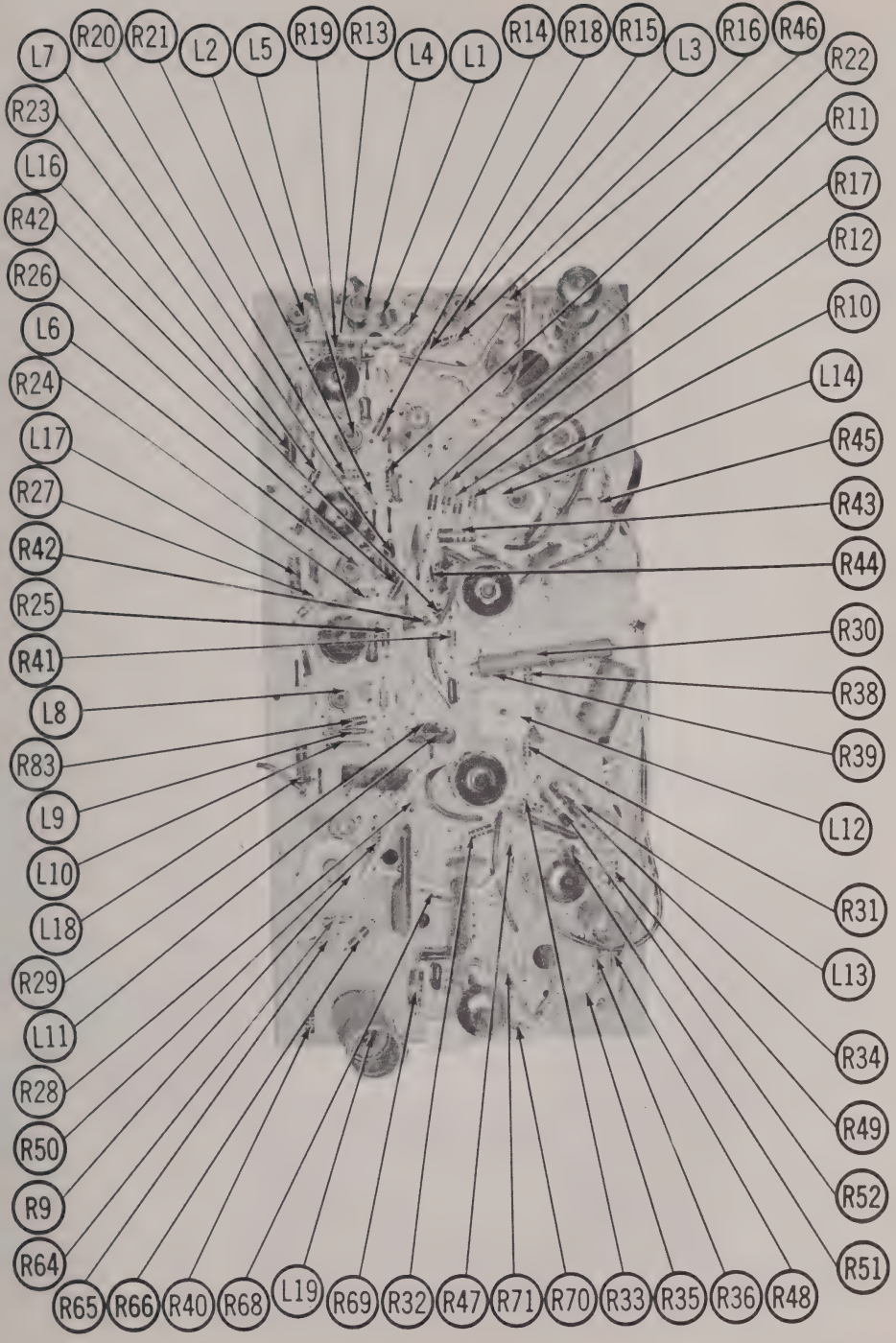
VHF RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Connect the negative lead of a 2.5 volt bias supply to point (T). Positive to chassis.

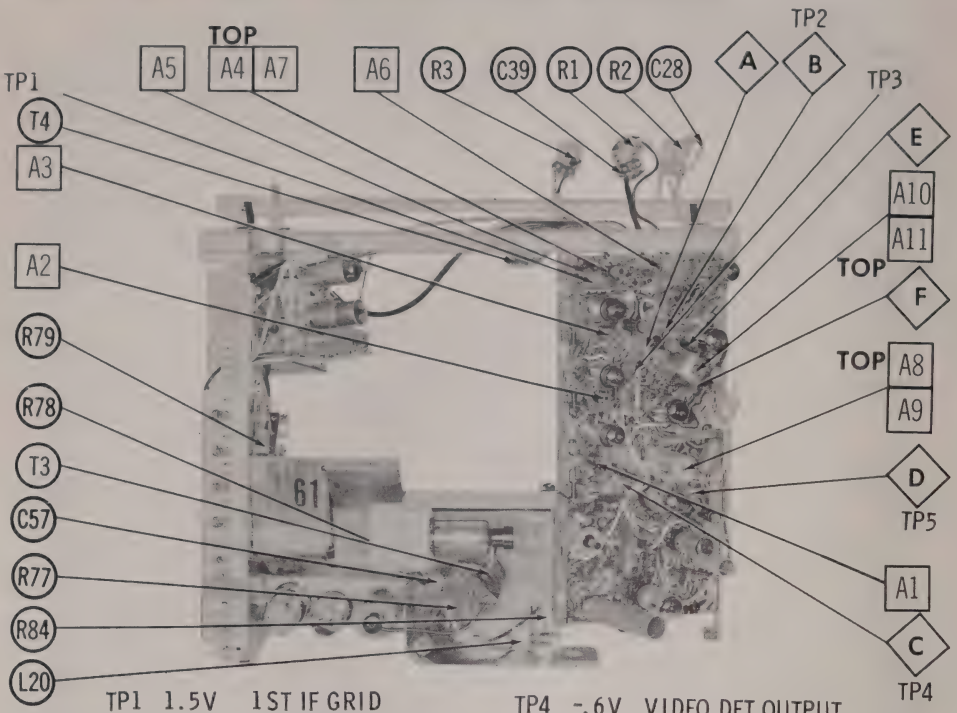
	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Across VHF Antenna Terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point (U). Low side to chassis.	A208, A209	Adjust for response similar to Fig. 202 with maximum amplitude approximately 1.25MC above Video carrier.
		207MC	205.25MC 209.75MC	12		A210 A211	
		201MC	199.25MC 203.75MC	11		A212 A213	
		195MC	193.25MC 197.75MC	10		A214 A215	
		189MC	187.25MC 191.75MC	9		A216 A217	
		183MC	181.25MC 185.75MC	8		A218 A219	
		177MC	175.25MC 179.75MC	7		A220 A221	
		85MC	83.25MC 87.75MC	6		A222 A223	
		79MC	77.25MC 81.75MC	5		A224 A225	
		69MC	67.25MC 71.75MC	4		A226 A227	
		63MC	61.25MC 65.75MC	3		A228 A229	
		57MC	55.25MC 59.75MC	2		A230 A231	

FIG. 201

FIG. 202

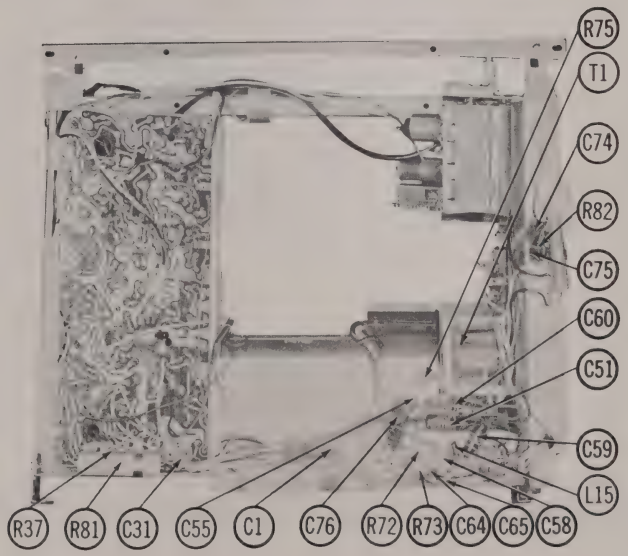


PRINTED BOARD - RESISTOR, INDUCTOR IDENT.

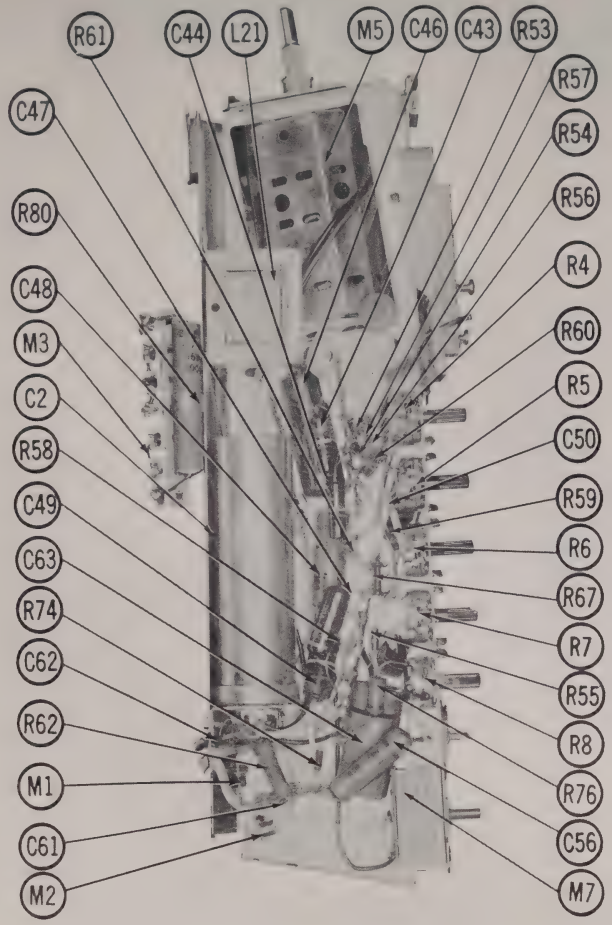


TP1	1.5V	1ST IF GRID	TP4	-.6V	VIDEO DET OUTPUT
TP2	-.7V	TUNER AGC	TP5	40V	PIX TUBE CATH
TP3	8V	AGC KEYING PLATE			

CHASSIS - REAR VIEW



CHASSIS - FRONT VIEW



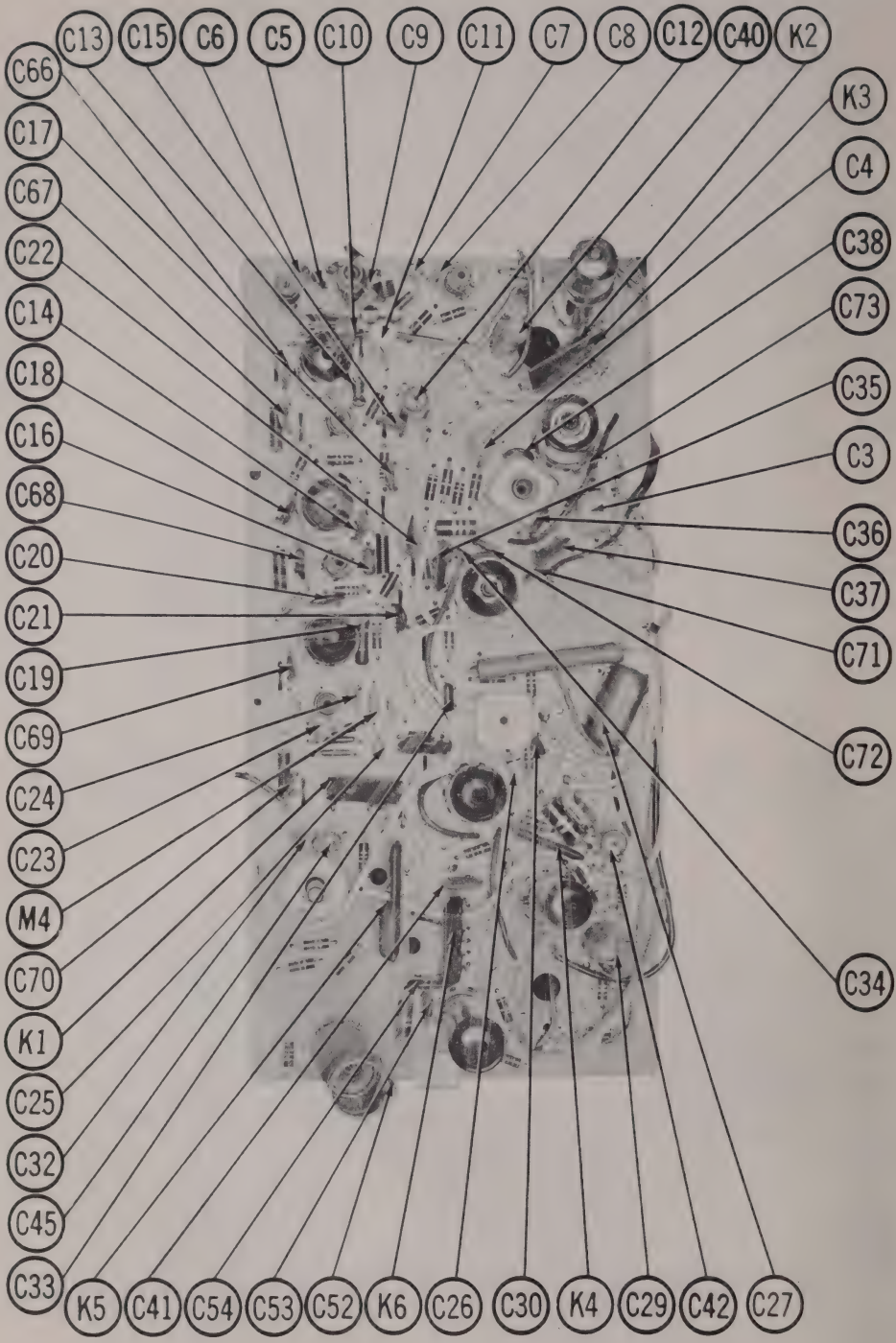
CHASSIS BOTTOM VIEW

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BZ6	320K	240Ω	33Ω	32Ω	▪140Ω	▪140Ω	0Ω		
V2	3BZ6	25K	INF	32Ω	31Ω	†30Ω	†30Ω	▪39Ω		
V3	3BZ6	.1Ω	180Ω	31Ω	30Ω	†5400Ω	†5400Ω	0Ω		
V4	8ET7	330K	600K	0Ω	10Ω	17Ω	27Ω	3300Ω	†2700Ω	†7000Ω
V5	5BR8	†50K	320K	•70K	10Ω	5Ω	†56K	†56K	220Ω	10K
V6	6BN8	INF	27K	INF	0Ω	5Ω	0Ω	†470K	10meg	0Ω
V7	5AQ5	NC	330Ω	33Ω	38Ω	†570Ω	†2700Ω	470K		
V8	3CS6	†1meg	0Ω	22Ω	23Ω	†30K	†9000Ω	1.3meg		
V9	10EG7	• 1.6meg	†295Ω	470Ω	• 3meg	†1.3meg	0Ω	45Ω	60Ω	
V10	6CG7	†10K	800K	1200Ω	22Ω	17Ω	†100K	96K	1200Ω	0Ω
V11	12DQ6A	NC	100Ω	TP	• †7000Ω	560K	TP	80Ω	0Ω	TOP CAP †8Ω
V12	12AX4GTA	NC	NC	1.2meg	NC	†60Ω	TP	60Ω	80Ω	
V13	1G3GT 1B3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP †270Ω
V14	19AFP4 19AUP4	23Ω	40K	†4700Ω	• †1meg	NC	NC	• 400K	30Ω	
V201	2FQ5	0Ω	6.2meg	38Ω	40Ω	†3900Ω	0Ω	0Ω		
V202	5EA8	†7500Ω	160K	†30K	40Ω	45Ω	†3700Ω	0Ω	0Ω	10K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

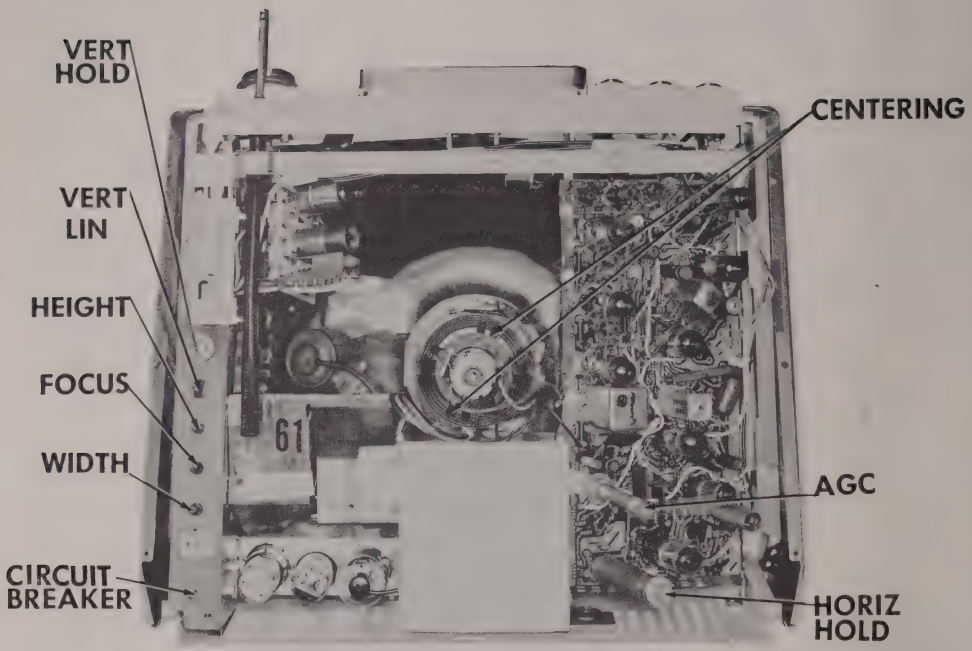
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
▪ MEASURED FROM PIN 2 OF V2.
† MEASURED FROM OUTPUT OF M1.
† MEASURED FROM PIN 3 OF V12.

NC NO CONNECTION
TP TIE POINT

RESISTANCE MEASUREMENTS



PRINTED BOARD - CAPACITOR, MISC. IDENT.



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Set Brightness and Contrast for a normal picture.

Turn the Horizontal Hold (Freq. Slug) clockwise until the picture loses sync. It may be necessary to switch off channel and back again for the picture to lose sync.

Turn the Horizontal Hold slowly counterclockwise until the picture just falls into sync.

Adjust the Adjust Width Control for a picture SLIGHTLY wider than necessary to fill the picture mask horizontally.

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove antenna lead.
2. Remove 6 screws holding rear cover. Remove rear cover.
3. Remove 3 screws at rear of cabinet (1 on each side, 1 by high voltage cage).
4. Lift up the felt washer at bottom of high voltage cage. Slide chassis out as far as possible.
5. Disconnect high voltage lead, yoke, and picture tube socket.
6. Remove chassis by sliding straight out (handle and knobs remain with chassis).

PICTURE TUBE REMOVAL

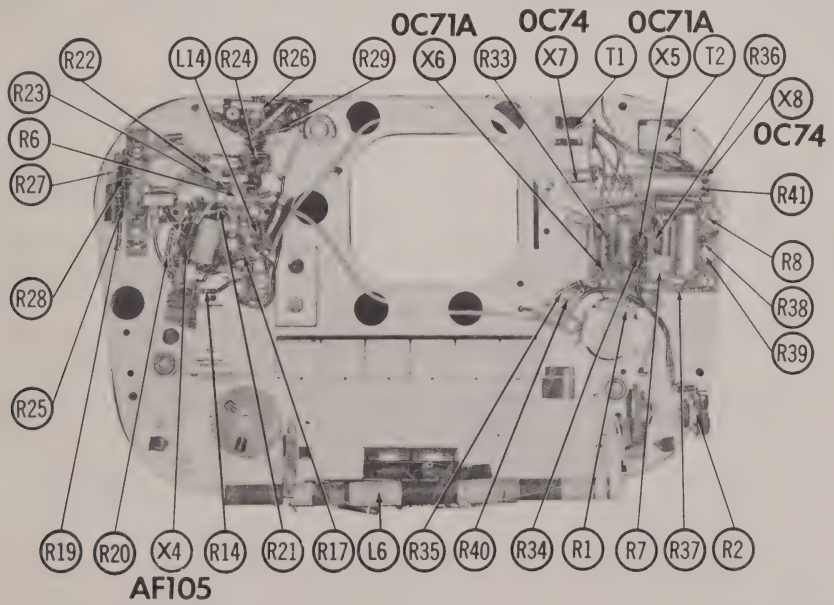
It is necessary to remove the chassis for picture tube removal.

PHOTOFACT® Folder

AKKORD MODEL PINGUIN U60

AKKORD MODEL
PINGUIN U60

TRADE NAME	Akkord Model Pinguin U60-US		
IMPORTER	The Sampson Company, 2242 South Western Avenue, Chicago 8, Illinois		
TYPE SET	Battery Operated Transistorized Portable FM-BC-SW Receiver		
POWER SUPPLY	6 Volts DC	RATING	25MA @ 6 Volts DC (No Signal, Minimum Volume) 100MA @ 6 Volts DC (Signal, Normal Volume)
TUNING RANGE	BROADCAST 515-1620KC FREQ. MOD. 88 – 108MC	MARINE BAND SHORT WAVE	1.6-4.8MC 4.8-12.3MC



HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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KF550

SET 539 FOLDER 3

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA: RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
X1	OC615	FM Converter				PNP
X2	OC614	1st FM IF Amp. -AM Conv.				PNP
X3	AF105	2nd FM-1st AM IF Amp.				PNP Note 1
X4	AF105	3rd FM-2nd AM IF Amp.				PNP
X5	OC71A	AF Amplifier	2N406	2N362	2N406	PNP
X6	OC71A	Driver	2N406	2N362	2N406	PNP
X7	OC74	Output				PNP Matched
X8	OC74	Output				PNP Pair

Note 1. Refer to last paragraph of Miscellaneous Adjustments when replacing.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: AKKORD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	1200	12							
B	1200	12							
C2	250	6		PTT-6250	NLW250-6		MLV200-6	TE-1105	
C3	3000	12							
C4	10	3		PTT-3010	NLW10-6	TT3X10	MLV10-3	TE-1053	
C5	10	3		PTT-3010	NLW10-6	TT3X10	MLV10-3	TE-1053	
C6	2,5	6		PTT-6003	NLW3-25	TT6X3	MLV2-6	TE-1082	
C7	2,5	6		PTT-6003	NLW3-25	TT6X3	MLV2-6	TE-1082	
C8	50	3		PTT-3050	NLW50-3	TT6X50	MLV50-3	TE-1058	
C9	100	12		SRE12V100	NLW100-12	TT15X100	MLV100-12	TE-1135	
C10	250	6		PTT-6250	NLW250-6		MLV200-6	TE-1105	
C11	0.2	6			TAN372			150D224X006A0	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C12	8200 5%				1DR5D82	VCM-35B-822J	MCJ473	MS 282
C13	3300 5%				1R5D33	CM-19B-332J	MCJ462	MS-233
C14	2-10							
C15	4 N150					*		10TCP V50
C16	4-20							
C17	20 N150							10TCP-Q22
C18	10-40							
C19	5-25							
C20	360 5%				22R5T36	CM-19B-361J		MS-336
C21	90 N750		N750-SI 91	TCN-91	C10Q91U			
C22	5-25							
C23	820		SI 820	D6-821	BYA10T82	CCD-821	GP382	10TS-T82
C24	5-25							
C25	1700		SI 1800	D6-182	L10D18	CCD-182	GP218	10TS D18
C26	10000		SI 10000	D6-103	BYA10S1	CCD-103	B-110	5HK-S10
C27	10000		SI 10000	D6-103	BYA10S1	CCD-103	B-110	5HK-S10
C28	10000		SI 10000	D6-103	BYA10S1	CCD-103	B-110	5HK-S10
C29	30000		SI 30000	DD-303	BYB6S3	CCD-303	GP130	5HK-S30
C30	20000		SI 20000	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C31	28	Note 1	SI 27	D6-270	L10Q27	CCD-270	GP427	10TS-Q27
C32	30000		SI 30000	DD-303	BYB6S3	CCD-303	GP130	5HK-S30
C33	100000			DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C34	100000			DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C35	20000 5%					*		10TCP-V5
C36	6 N150				1R5D2	CCD-202	GP220	10TS-D20
C37	2000 10%							
C38	.1 150V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C39	30000		SI 30000	DD-303	BYB6S3	CCD-303	GP130	5HK-S30
C40	500		SI 500	D6-501	BYA10T5	CCD-501	B-350	10TS-T50
C41	1000		SI 1000	D6-102	BYA10D1	CCD-102	B-210	5HK-D10
C42	1000		BPD-001	D6-102	BYA10D1	CCD-102	B-210	5HK-D10
C43	4700		SI 4700	D6-472	BYA10D47M	CCD-472	B-247	5HK-D47

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C44	10		SI 10	D6-100	L10Q1	CCD-100	GP410	10TS-Q10
C45	20		SI 20	D6-200	L10Q2	CCD-200	GP420	10TS-Q20
C46	.1 150V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C47	.1 150V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C48	30000		SI 30000	DD-303	BYB6S3	CCD-303	GP130	5HK-S30
C49	30000		SI 30000	DD-303	BYB6S3	CCD-303	GP130	5HK-S30
C50	30000		SI 30000	DD-303	BYB6S3	CCD-303	GP130	5HK-S30

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
Note 1. Value varies depending on X3 (Refer to last paragraph of Miscellaneous Adjustments).

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AKKORD PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100K	½	PO2400	AB-41				Volume
B	Shaft			AK-29				
R2	50K	½	PO2401					Tone
R3	5000Ω	1/4						Bias, Oscillator
R4	20K	1/4						SW Bandspread
R5	5000Ω	1/4						Bias, 1st IF
R6	5000Ω	1/4						Bias, 2nd IF
R7	30K	1/4						Bias, Driver
R8	5000Ω	1/4						Bias, Output

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	WORKMAN TV PART No.	REMARKS
R9	47K			
R10	1000Ω			
R11	330Ω			
R12	27Ω			
R13	39K			
R14	470Ω			
R15	47Ω			
R16	100Ω			
R17	680Ω			
R18	470Ω			
R19	1000Ω			
R20	470Ω			
R21	470Ω			
R22	8200Ω			
R23	150Ω			
R24	2200Ω			
R25	3900Ω			

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	WORKMAN TV PART No.	REMARKS
R26	39K			
R27	100K			
R28	27K			
R29	1000Ω			
R30	150K			
R31	82K			
R32	8200Ω			
R33	800K			
R34	10K			
R35	100Ω			
R36	47K			
R37	560Ω			
R38	330Ω			
R39	40ΩCold			
R40	470Ω			
R41	100Ω			
R42	27Ω			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: AKKORD PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	NOTES
L1	FM Ant.	BV351/002					
L2	RF Choke	BV377/001					
L3	RF Choke	BV378/001					
L4	FM Osc.	BV371/002					
L5	1st FM IF	BV390/001					
L6A	BC Loopstick	BV350/015					
B	MB Loopstick						
L7	SW Ant.	BV352/001					

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF) (cont)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		AKKORD PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L8	BC Osc.	BV374/011					
L9	MB Osc.	BV373/006					
L10	SW Osc.	BV372/001					
L11A	2nd FM IF	BV413/001					
B	1st AM IF						
L12A	3rd FM IF	BV413/002					
B	2nd AM IF						
L13	3rd AM IF	BV412/007					
L14	RF Choke	BV157/003					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	AKKORD PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.2	1	BV172/014					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	INDUCTANCE		REPLACEMENT DATA					NOTES
			AKKORD PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	205Ω CT		BV173/009					

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	AKKORD PART No.	QUAM PART No.	
SP1	4"x 7"	PM	50-70Ω	LA2400		

BATTERIES

ITEM No.	VOLTAGE	AKKORD PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V	*		230 *		A100 *		M-13R*	* 4 Required

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		AKKORD PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	OA172	DI 1001 *		1N295	1N295	* Limiter
M3	OA172	DI 1001 *		1N295	1N295	♦ AM AVC
M4	K5/2	DI 1350 ♦		1N60	1N60	♣ AM Detector
M5	K5/2	DI 1350 ♣		1N60	1N60	† "Zenor" Diode (Regulation)
M6	1, 5/10	†				

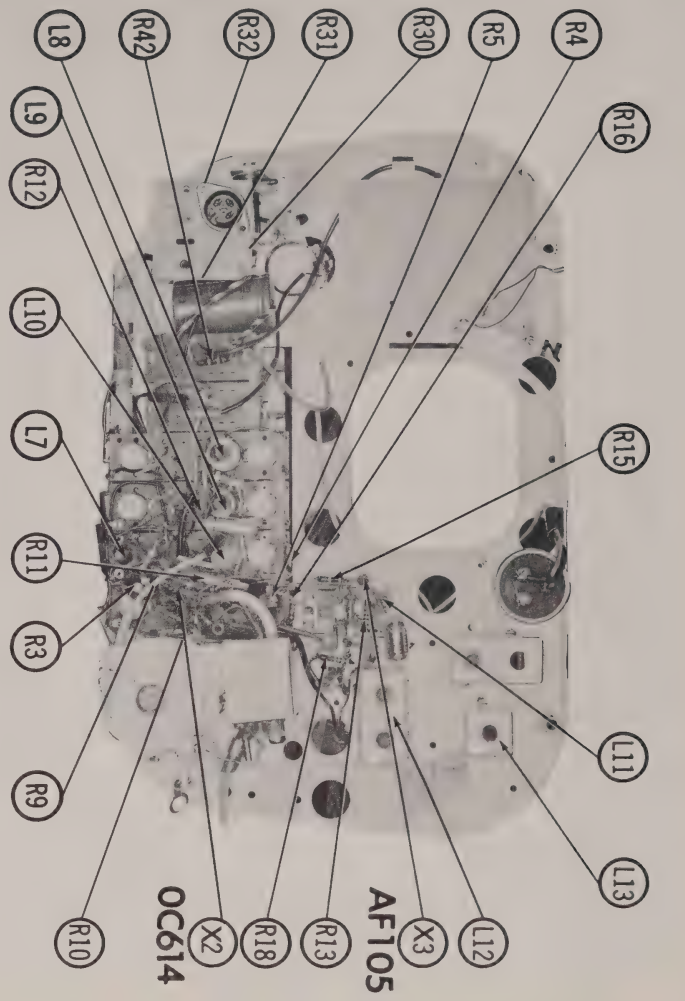
MISCELLANEOUS

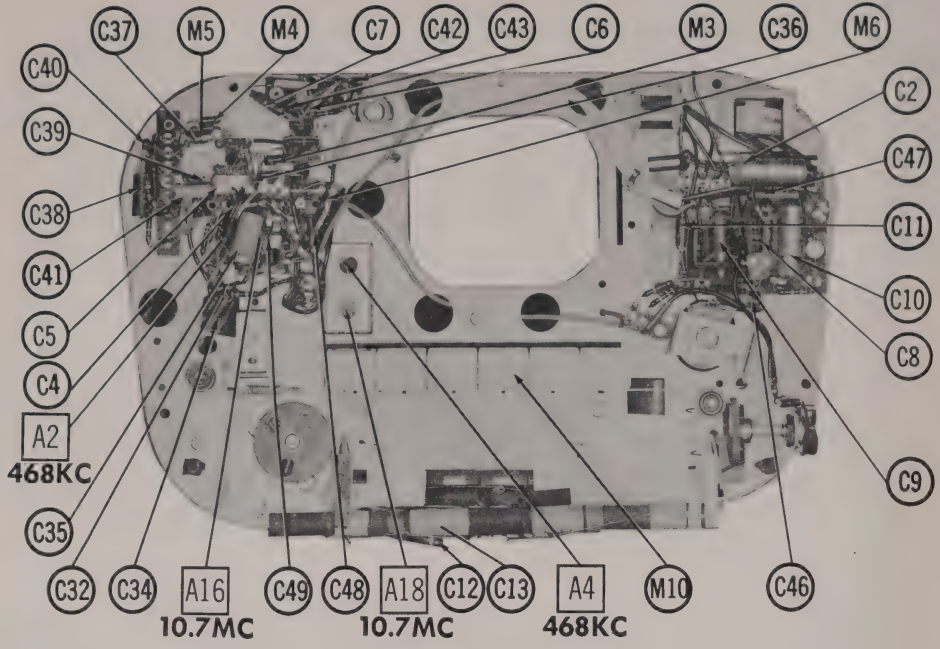
ITEM No.	PART NAME	AKKORD PART No.	NOTES
M7	FM Tuning Assy.		
M8	Tuning Cap.		FM-AM, 4 Gang
M9	FM Detector Assy.	BV414/001	
M10	Switch		Function Selector (Pushbutton Type)
M11	Antenna	AT2400	Telescopic

WIRING DATA

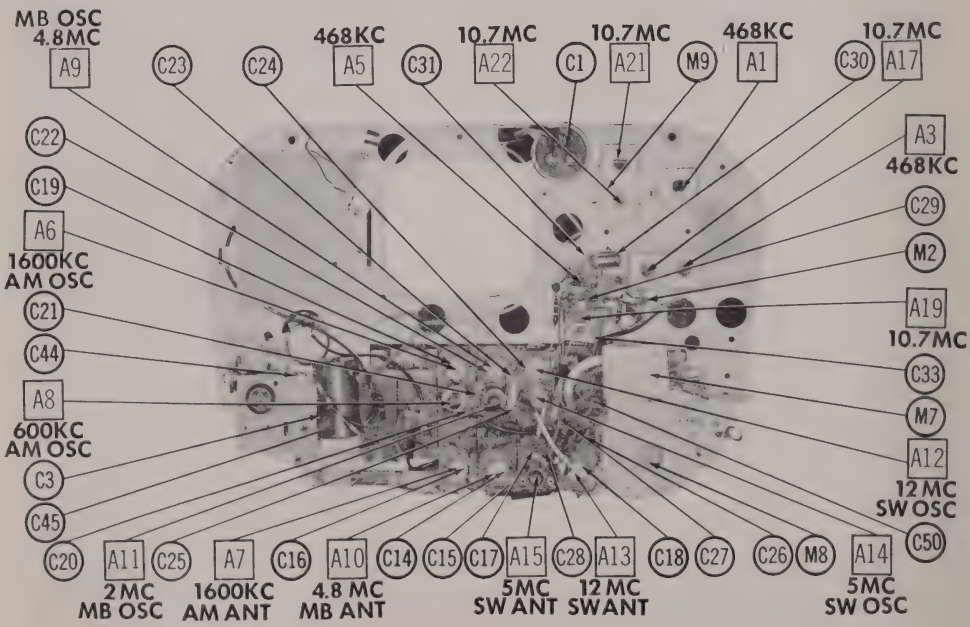
General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—BOTTOM VIEW





CHASSIS-TOP VIEW



CHASSIS-BOTTOM VIEW

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position Output of signal generator should be no higher than necessary to obtain an output reading .

Suggested Alignment Tools: A6, A7, A9, A10, A12, A13, A24.... GENERAL CEMENT #5000, 5003, 5066, 8276, 8290, 9087, 9089
WALSCO #2512, 2525, 2528

A23, A27..... GENERAL CEMENT #8721, 8722
WALSCO #2519

AM ALIGNMENT — SELECTOR IN AM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Loop	(400% 30% AM) 468KC	(AM) Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4, A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.	"	1600KC	1600KC	"	A6, A7	"
3.	"	600KC	600KC	"	A8	Adjust for maximum output. Repeat Steps 2 and 3.
4.	"	4.8MC	(MB) 4.8MC	"	A9, A10	Adjust for maximum output.
5.	"	2MC	2MC	"	A11	"
6.	"	12MC	(SW) 12MC	"	A12, A13	"
7.	"	5MC	5MC	"	A14, A15	"

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE — SELECTOR IN FM POSITION

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
8.	Across FM antenna terminals.	10.7MC (450KC Swp)	(FM) Point of non-interference.	Vert. amp. thru a demodulator probe in series with 10mmf to point (A). Low side to chassis.	A16, A17, A18, A19, A20	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown.
9.	"	"	"	Vert. amp. to point (B). Low side to chassis.	A21, A22	Adjust A21 for maximum amplitude . Adjust A22 to place marker at center of crossover lines as in Fig. 2. Re-adjust A21 for maximum amplitude and straightness of crossover lines.
10.	"	10.7MC (400% AM)	"	Across voice coil.		Adjust AM Rejection Control (Part of M9) for MINIMUM 400% on scope.

FM RF ALIGNMENT — SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
11.	Across FM antenna terminals.	108MC (400% Mod. 450KC Swp.)	(FM) 108MC	Across voice coil.	A23, A24	Adjust for maximum output.
12.	"	88MC	88MC	"	A25, A26	"

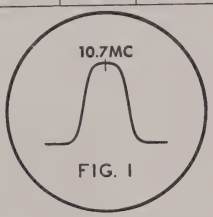


FIG. 1

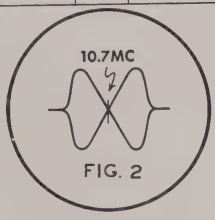


FIG. 2

MISCELLANEOUS ADJUSTMENTS

BIAS ADJUSTMENTS

For measuring the voltages, a VTVM or a voltmeter with at least 10K ohms per volt should be used. The milliammeter should have at least 50 ohms internal resistance.

Adjustments should be made in the order given.

Audio

Insert a 0-10ma meter in series with the center tap of the Audio Output transformer. Turn Volume control fully counterclockwise. Press FM key. Adjust R8 for 6ma without signal. Connect a Voltmeter across R37. Adjust R7 for 1 volt drop across R37. Remove meters.

IF Amplifier

Connect Voltmeter across R21. Adjust R6 for .56 volt drop across R21. Connect Voltmeter across R18 and adjust R5 for .56 volt drop across R18. Disconnect meter.

Oscillator

Connect Voltmeter across R10. Press Short Wave key and adjust R3 for .4 volt drop across R10. Press FM key and check voltage drop across R10. It should be between .9 and 1.3 volts.

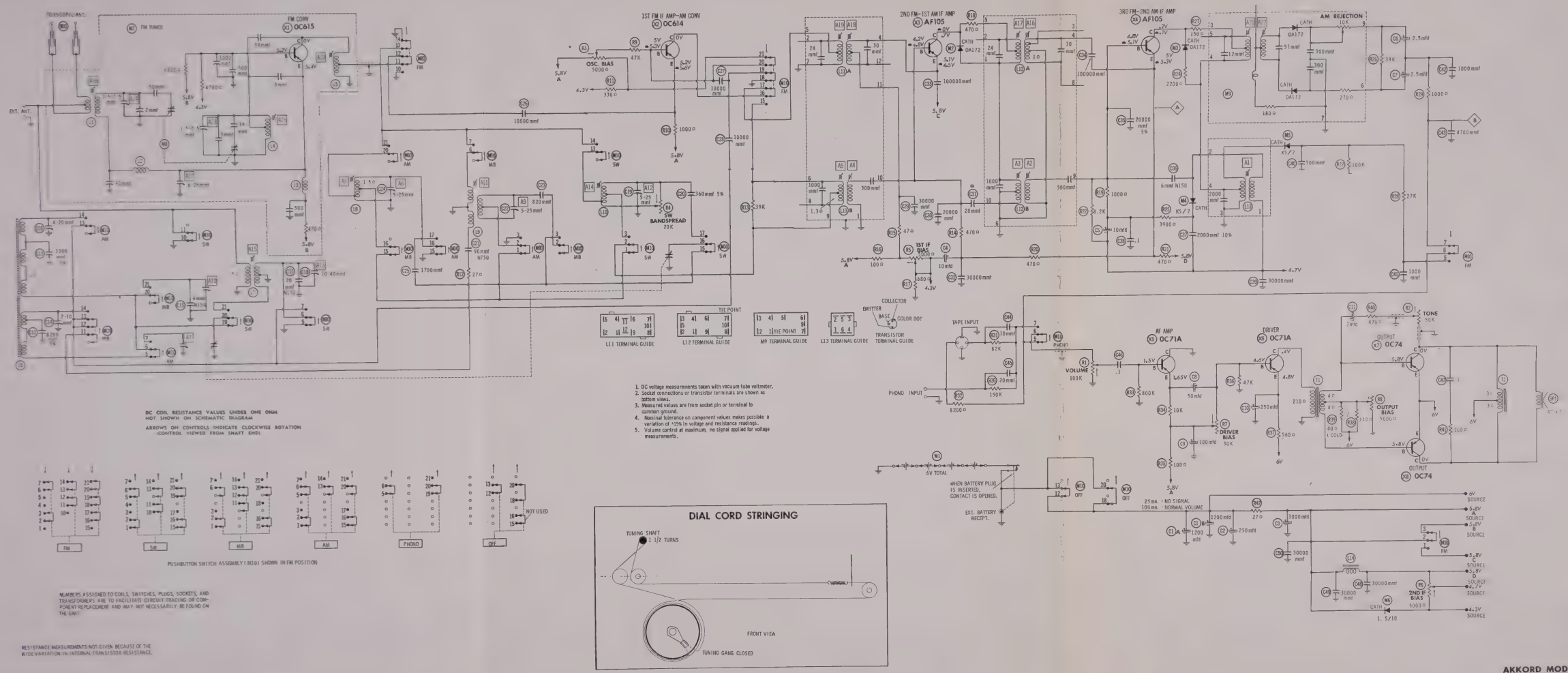
MISCELLANEOUS ADJUSTMENTS

A27 is used to adjust the amplitude of the oscillations of the FM Oscillator. This adjustment is necessary only when the FM Converter transistor is replaced. The amplitude should be set for between 60 and 120 millivolts on the emitter of the FM Converter by adjusting A27. This voltage should remain as uniform as possible across the entire FM band.

In adjusting the Short Wave band, the amplitude of the Oscillator should be adjusted to a maximum of 40 millivolts with R4. This amplitude is measured from the emitter of the AM Converter transistor to chassis.

In replacing X3 transistor, it is imperative that the Neutralizing capacitor C31 be of the proper value. Besides the designation of the type, the transistor is also imprinted with different numbers;

If the number is	20	25	30	35
The capacitor should be	22mmf	24mmf	28mmf	34mmf



DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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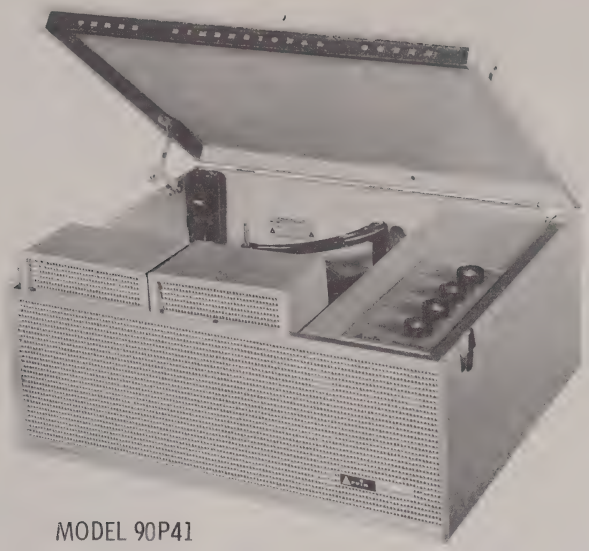
AKKORD MODEL
PINGUIN U60

PHOTOFACT® Folder with CIRCUITRACE®

ARVIN MODELS 90P41, 90P47, 90P53, 90P58 (Ch. 1.49500, 1.63001)

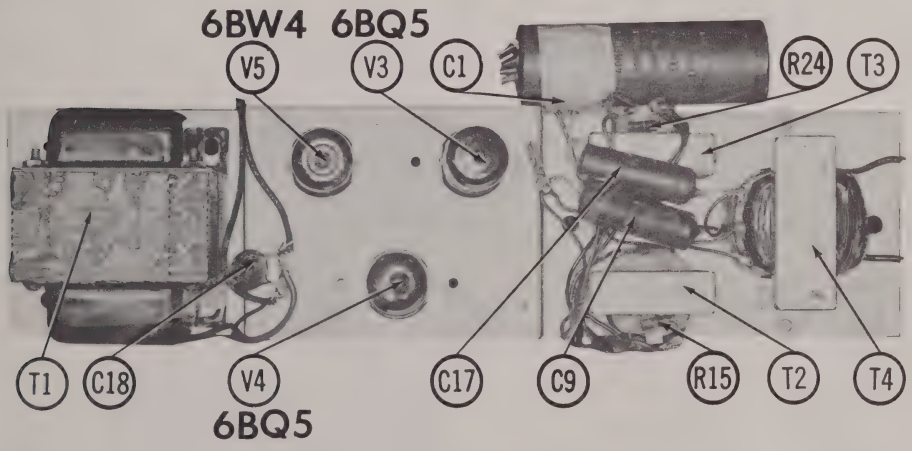
ARVIN MODELS 90P41, 90P47, 90P53, 90P58 (Ch. 1.49500, 1.63001)



MODEL 90P41

TRADE NAME	Arvin Models 90P41, 90P47 (Ch. 1.63001); 90P53, 90P58 (Ch. 1.49500)
MANUFACTURER	Arvin Industries, Inc., Columbus, Indiana
TYPE SET	AC Operated 5 Tube Stereo Phono Amplifier With 4 Speed Automatic Record Changer
POWER SUPPLY	110 – 120 Volts AC, 60 Cycles RATING 56 Watts, .55 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON RECORD CHANGER – SEE COLLARO CONQUEST (REVISED) – PHOTOFACT SET 408 FOLDER 6 OR RECORD CHANGER MANUAL RC-11



HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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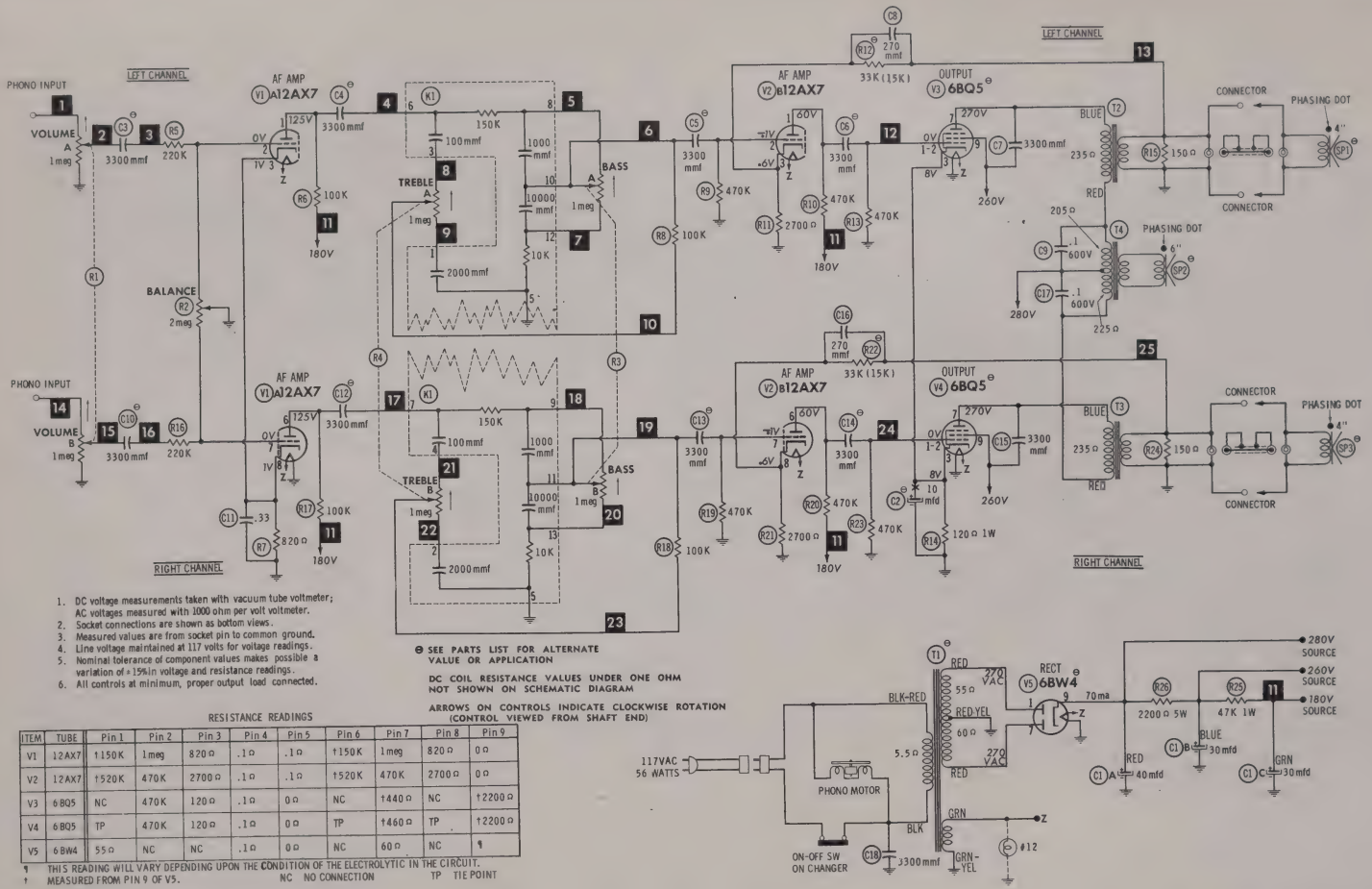

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†150K	1meg	820Ω	.1Ω	.1Ω	†150K	1meg	820Ω	0Ω
V2	12AX7	†520K	470K	2700Ω	.1Ω	.1Ω	†520K	470K	2700Ω	0Ω
V3	6BQ5	NC	470K	120Ω	.1Ω	0Ω	NC	†440Ω	NC	†2200Ω
V4	6BQ5	TP	470K	120Ω	.1Ω	0Ω	TP	†460Ω	TP	†2200Ω
V5	6BW4	55Ω	NC	NC	.1Ω	0Ω	NC	60Ω	NC	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 9 OF V5. NC NO CONNECTION TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE

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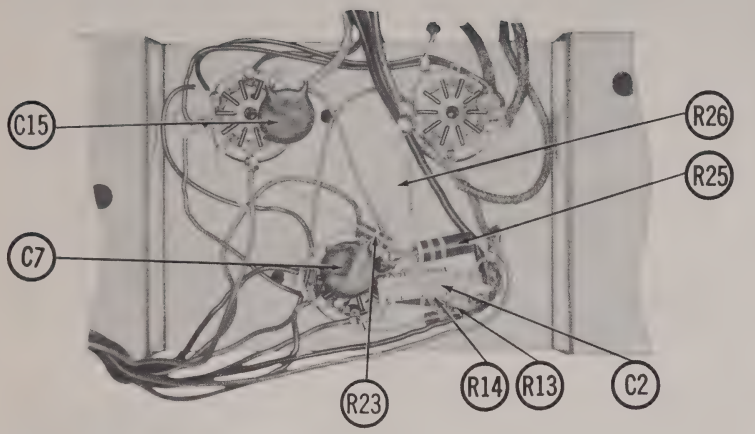
ARVIN MODELS 90P41, 90P47, 90P53, 90P58 (Ch. 1.49500, 1.63001)

OUTPUT SECTION



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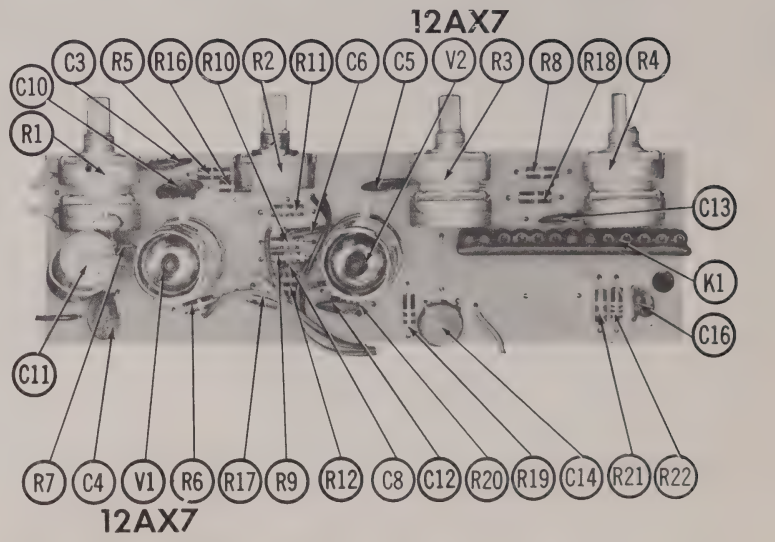
ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE
V1	Left Channel AF Amp. - Right Channel AF Amp.	12AX7
V2	Left Channel AF Amp. - Right Channel AF Amp.	12AX7
V3	Left Channel Output	6BQ5 ①
V4	Right Channel Output	6BQ5 ①
V5	Rectifier	6BW4 ②

① Models 90P53, 90P58 use 7591 in this application.
② Models 90P53, 90P58 use 6CA4 in this application.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA ARVIN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	40	300	44772-9	PR4-200	BBRT0185	TCD77	CDBQ-4422	TVA-4750	
B	30	300				TC78			
C	30	300							
C2	10	10		PTT-10010	NLW10-15	TT12X10	MLV10-10	TE-1114	

PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	3300	Note 1	BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C4	3300	Note 1	BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C5	3300	Note 1	BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C6	3300	Note 1	BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C7	3300		BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C8	270		DI-270	DD-271	L10T27	CCD-271	B-327	10TS-T27
C9	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P10
C10	3300	Note 1	BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C11	.33 100V		P288N-33		CUB2P33	1DP-4-334	GEM-2033	2TM-P33
C12	3300	Note 1	BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C13	3300	Note 1	BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C14	3300	Note 1	BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C15	3300		BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C16	270		DI-270	DD-271	L10T27	CCD-271	B-327	10TS-T27
C17	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P10
C18	3300		BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33

Note 1. Models 90P53, 90P58 use 10000mmf in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ARVIN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	1meg	1/2	47100-2					Volume, Left Channel
B	1meg	1/2						Volume, Right Channel
R2	2meg	1/2	45250-17					Balance
R3A	1meg	1/2	47100-2					Bass, Left Channel
B	1meg	1/2						Bass, Right Channel
R4A	1meg	1/2	47100-2					Treble, Left Channel
B	1meg	1/2						Treble, Right Channel

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R5	220K				R16	220K			
R6	100K				R17	100K			
R7	820Ω				R18	100K			
R8	100K				R19	470K			
R9	470K				R20	470K			
R10	470K				R21	2700Ω			
R11	2700Ω				R22	33K			(15K) *
R12	33K			(15K) *	R23	470K			
R13	470K				R24	150Ω			
R14	120Ω 1W				R25	47K 1W			
R15	150Ω				R26	2200Ω 5W	PW5-2200	5W-SQ-2200	

* Value used in Models 90P53, 90P58.

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	ARVIN PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	117V ② .55A	540VCT ②, 070A	6.3V ② 3A	48989-2 ①	P-3148	PC-8420	24R13U ② ③	R-11OA ②③	① Alt. Part #48989-1 Used in Models 90P53, 90P58 ② Tape 5V & CT on 6.3 Windings. ③ Drill New Mounting Holes.
	SEC. 3	SEC. 4	SEC. 5						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	ARVIN PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5100Ω	6-8Ω	46200-9	A-2900	A-3877	22S87	S-63X	① Drill New Mounting Hole.
T3	5100Ω	6-8Ω	46200-9	A-2900	A-3877	22S87	S-63X	
T4	7200Ω CT	6-8Ω	48921-2	A-2901 ①	A-3870	22S88	S-55X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ARVIN PART No.	QUAM PART No.	
SP1	4"	PM	6-8Ω	44088 *	4A1Z4.6	* Models 90P41, 90P47
SP2	6"	PM	6-8Ω	46408-1 *	6A1Z8	† Models 90P53, 90P58
SP3	4"	PM	6-8Ω	44088 *	4A1Z4.6	
	8"	PM	6-8Ω	49100-1 †	8A21Z6.4	
	5"	PM	6-8Ω	45599-10 †	5A07Z6.4	

COMPONENT COMBINATIONS

ITEM No.	* USE	DESCRIPTION	ARVIN PART No.	REPLACEMENT DATA
K1	Tone Comp.	(2) 100mmf, (2) 1000mmf, (2) 2000mmf, (2) 10000mmf, (2) 10K, (2) 150K	49074	

PHONO CARTRIDGE & NEEDLES

*NEEDLE LISTINGS SHOWN ARE FOR RESPECTIVE REPLACEMENT CARTRIDGES ONLY.

ITEM No.	REPLACEMENT DATA								NOTES
	ARVIN PART No.		ASTATIC PART No.		ELECTRO-VOICE PART No.		SONOTONE PART No.		
	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	
M1	46507-6 †	Not Req.	13TB	Not Req.	26S	S1-1 * & S3-3 *	8TA4-S	N-8TA-S *	† Part #46507-9 used in Models 90P53, 90P58

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Spindle	47477	45 RPM
Knob	48998-29	
Cabinet	47857-3	Mahogany, Models 90P53, 90P58
Cabinet	47857-8	Walnut, Models 90P53, 90P58
Cabinet	49094-8	Speaker, Walnut, Models 90P53, 90P58
Cabinet	49094-3	Speaker, Mahogany, Models 90P53, 90P58
Cabinet	49044-1	Speaker, Gold, Models 90P41, 90P47
Cabinet	49044-7	Speaker, White, Models 90P41, 90P47
Cabinet	48997-1	Gold, Models 90P41, 90P47
Cabinet	48997-7	White, Models 90P41, 90P47

WIRING DATA

General-use Unshielded Hook-up Wire.....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type) ..... Use BELDEN No. 8874
Low-Loss Shielded Lead (Interconnecting)..... Use BELDEN No. 8401
Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT® Folder

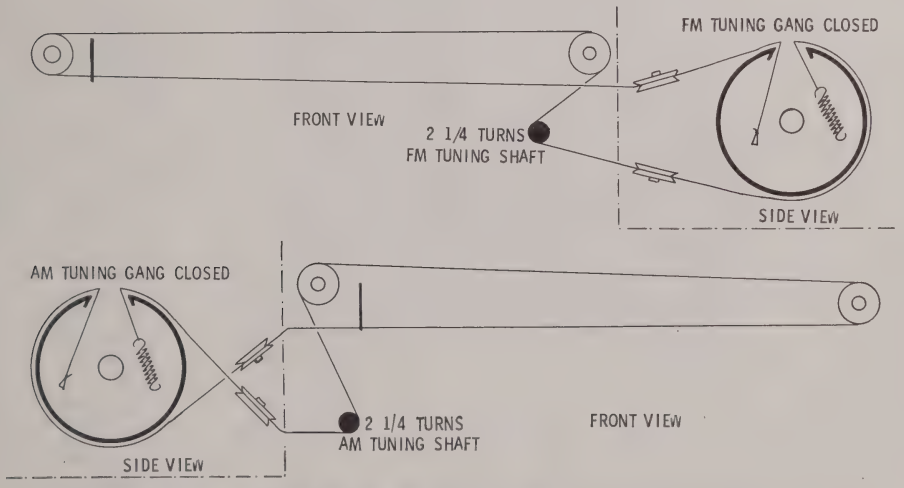
**BELL SOUND
MODEL 2441**

BELL SOUND
MODEL 2441

BELL SOUND
MODEL 2441

TRADE NAME	Bell Sound Model 2441		
MANUFACTURER	Bell Sound Div., Thompson Ramo Wooldridge Inc., 555 Marion Road, Columbus 7, Ohio		
TYPE SET	AC Operated 12 Tube FM-AM Tuner		
POWER SUPPLY	110 – 120 Volts AC, 60 Cycles	RATING	55 Watts, .5 Amp. @117 Volts AC
TUNING RANGE—BROADCAST	540 – 1600KC	FREQ. MOD.	88 – 108MC

DIAL CORD STRINGING



HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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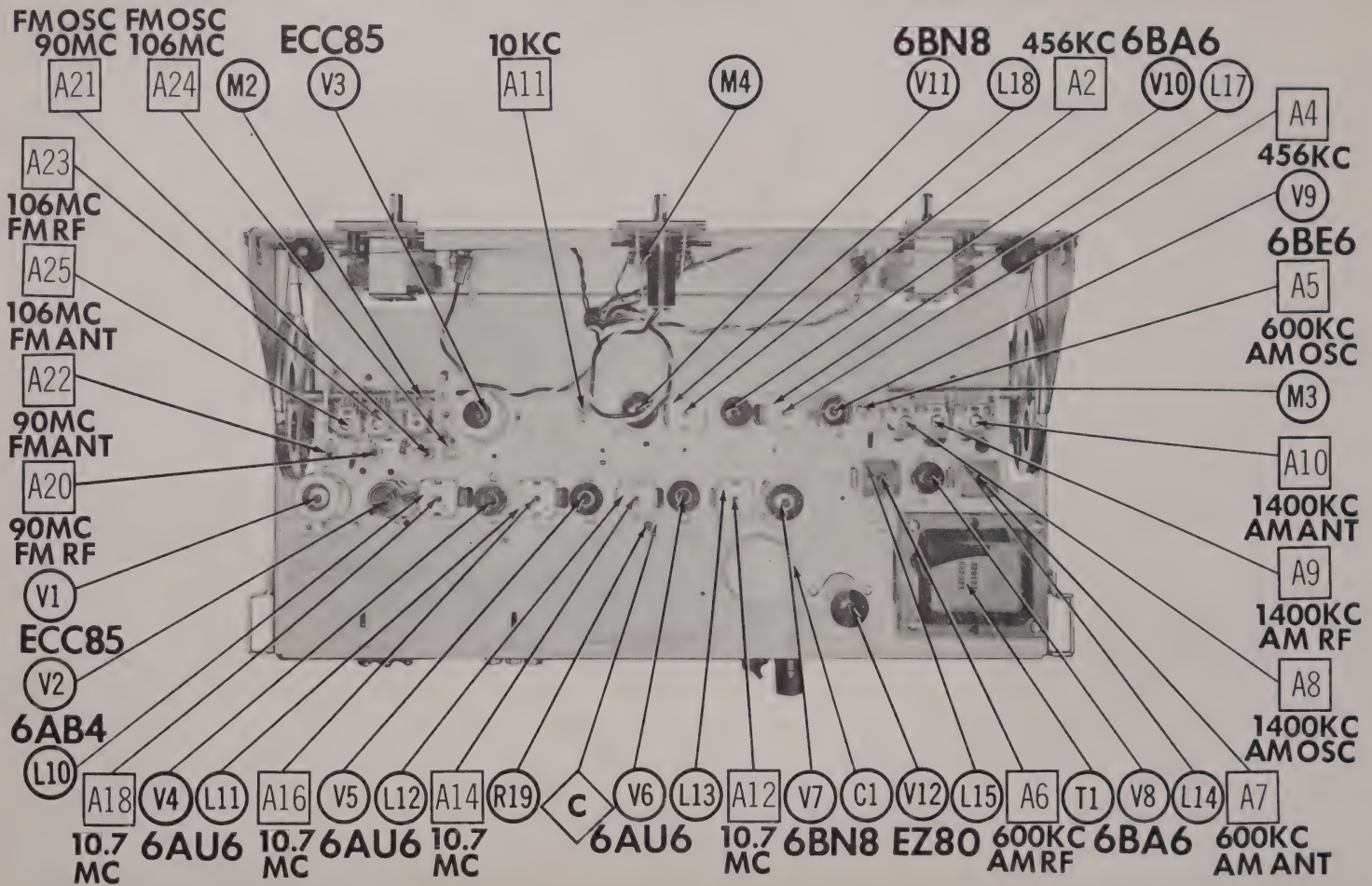
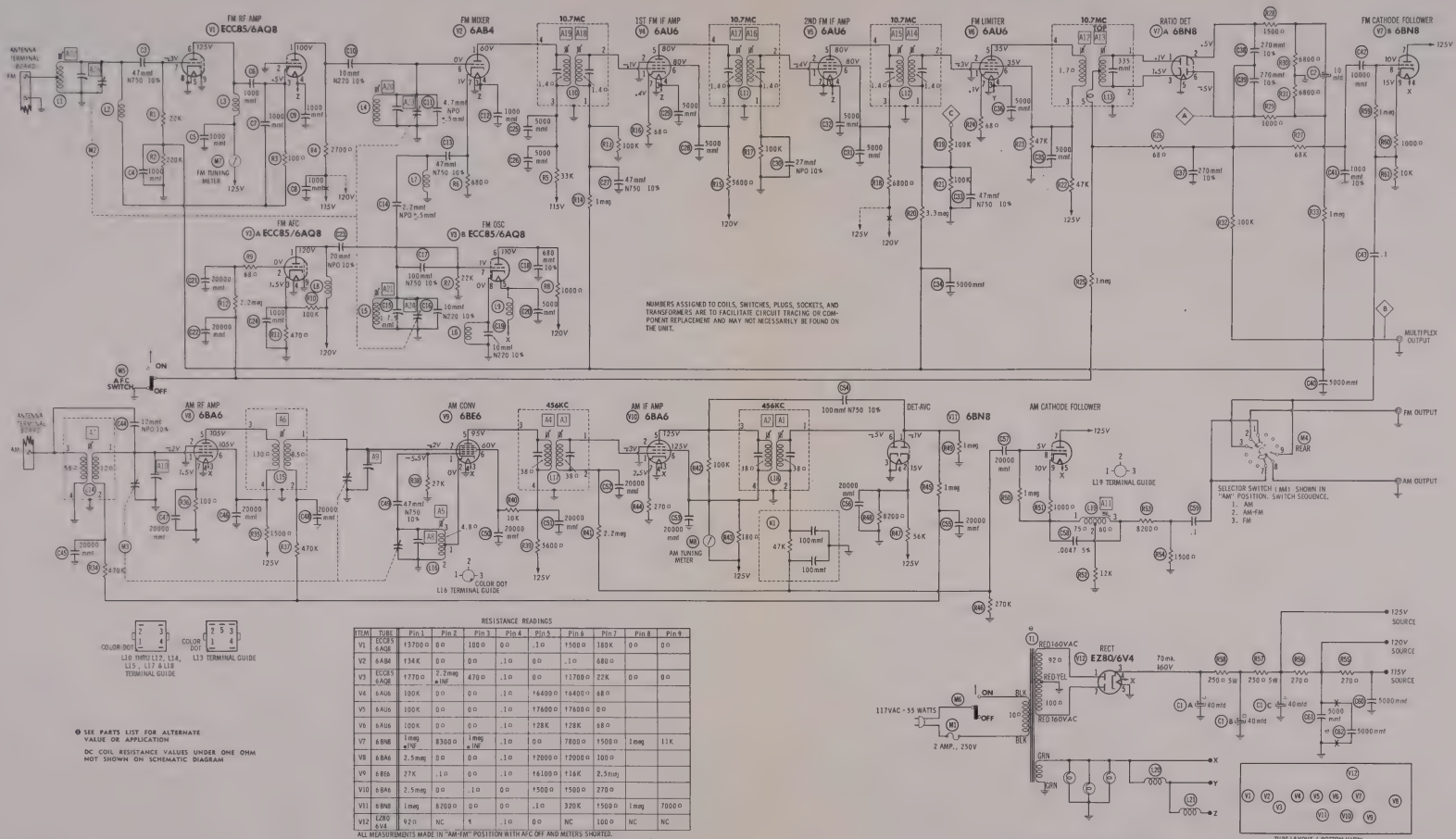
KL580

SET 539 FOLDER 5



CHASSIS-TOP VIEW



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC85 6AQ8	†3700Ω	0Ω	100Ω	0Ω	.1Ω	†500Ω	180K	0Ω	0Ω
V2	6AB4	†34K	0Ω	0Ω	.1Ω	0Ω	.1Ω	680Ω		
V3	ECC85 6AQ8	†770Ω	2.2meg ∗INF	470Ω	.1Ω	0Ω	†1780Ω	22K	0Ω	0Ω
V4	6AU6	100K	0Ω	0Ω	.1Ω	†6400Ω	†6400Ω	68Ω		
V5	6AU6	100K	0Ω	0Ω	.1Ω	†7600Ω	†7600Ω	0Ω		
V6	6AU6	100K	0Ω	0Ω	.1Ω	†28K	†28K	68Ω		
V7	6BN8	1meg ∗INF	8300Ω	1meg ∗INF	.1Ω	0Ω	7800Ω	†500Ω	1meg	11K
V8	6BA6	2.5meg	0Ω	0Ω	.1Ω	†2000Ω	†2000Ω	100Ω		
V9	6BE6	27K	.1Ω	0Ω	.1Ω	†6100Ω	†16K	2.5meg		
V10	6BA6	2.5meg	0Ω	.1Ω	0Ω	†500Ω	†500Ω	270Ω		
V11	6BN8	1meg	8200Ω	0Ω	0Ω	.1Ω	320K	†500Ω	1meg	7000Ω
V12	EZ80 6V4	92Ω	NC	†	.1Ω	0Ω	NC	100Ω	NC	NC

ALL MEASUREMENTS MADE IN "AM-FM" POSITION WITH AFC OFF AND METERS SHORTED.
† THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
■ MEASURED WITH "AFC" ON.
† MEASURED FROM PIN 3 OF V12.
NC NO CONNECTION

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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BELL SOUND MODEL 2441

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use only enough generator output to provide a usable indication.
Suggested Alignment Tools: A1 thru A4, A6, A7, A12 thru A22. . GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A5, A11. . . . . GENERAL CEMENT #8721, 8722
WALSCO #2519
A8, A9, A10, A23, A24, A25. . . . . GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

AM ALIGNMENT — SELECTOR IN AM POSITION

With AM Tuning gang fully closed, set AM pointer to left hand dial indexing mark on front of chassis panel.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM AND SCOPE	ADJUST	REMARKS
1.	High side thru .1mfd to pin 1 (grid) of AM IF Amp. Low side to chassis.	456KC (40KC Swp)	(AM) Tuning gang fully open.	AC probe of VTVM and scope across AM Output jack.	A1, A2	Adjust for maximum output on VTVM and symmetrical response on scope.
2.	High side thru .1mfd to RF stator lug of AM tuning gang.	"	"	"	A3, A4	"
3.	High side thru 200mmf to antenna terminal. Low side to chassis.	600KC (400% 30% AM)	Second dial indexing mark on front panel of chassis.	"	A5, A6, A7	Adjust for maximum output.
4.	"	1400KC	Right hand dial indexing mark on front panel of chassis.	"	A8, A9, A10	"
5.	High side thru 100K to pin 8 (grid) of AM cathode follower (V11). Low side to chassis.	10KC		"	A11	Adjust for MINIMUM output.

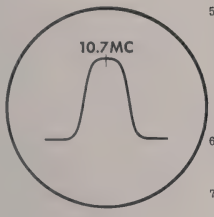


FIG. 1

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM—SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	High side thru .01mfd to pin 1 (grid) of FM Limiter. Low side to chassis.	10.7MC (Unmod.)	(FM) Point of non-interference.	DC probe to point Ⓐ. Common to chassis.	A12	Adjust for maximum deflection.
7.	"	"	"	DC probe to point Ⓑ. Common to chassis.	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
8.	High side thru .01mfd to pin 1 (grid) of 2nd FM IF. Low side to chassis.	"	"	DC probe to point Ⓒ. Common to chassis.	A14, A15	Adjust for maximum deflection.
9.	High side thru .01mfd to pin 1 (grid) of 1st FM IF. Low side to chassis.	"	"	"	A16, A17	"
10.	High side thru .01mfd to pin 6 (grid) of FM Mixer. Low side to chassis.	"	"	"	A18, A19	"

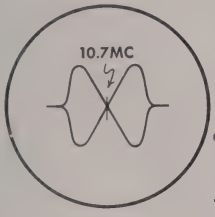


FIG. 2

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE — SELECTOR IN FM POSITION

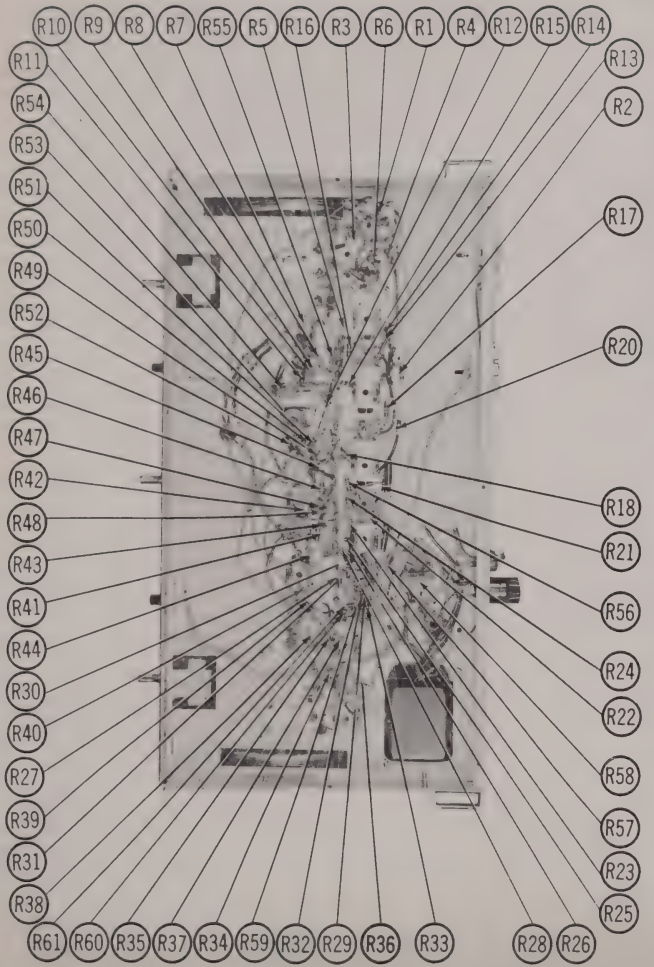
Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6.	High side thru .01mfd to pin 1 (grid) of FM Limiter. Low side to chassis.	10.7MC (450KC Swp)	(FM) Point of non-interference.	Vert. amp. to point Ⓐ. Low side to chassis.	A12	Disconnect stabilizing capacitor C2. Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown. Reconnect C2.
7.	"	"	"	Vert. amp. to point Ⓑ. Low side to chassis.	A13	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A12 for maximum amplitude and straightness of cross-over lines.
8.	High side thru .01mfd to pin 1 (grid) of 2nd FM IF. Low side to chassis.	"	"	Vert. amp. to point Ⓒ. Low side to chassis.	A14, A15	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown.
9.	High side thru .01mfd to pin 1 (grid) of 1st FM IF. Low side to chassis.	"	"	"	A16, A17	"
10.	High side thru .01mfd to pin 6 (grid) of FM Mixer. Low side to chassis.	"	"	"	A18, A19	"

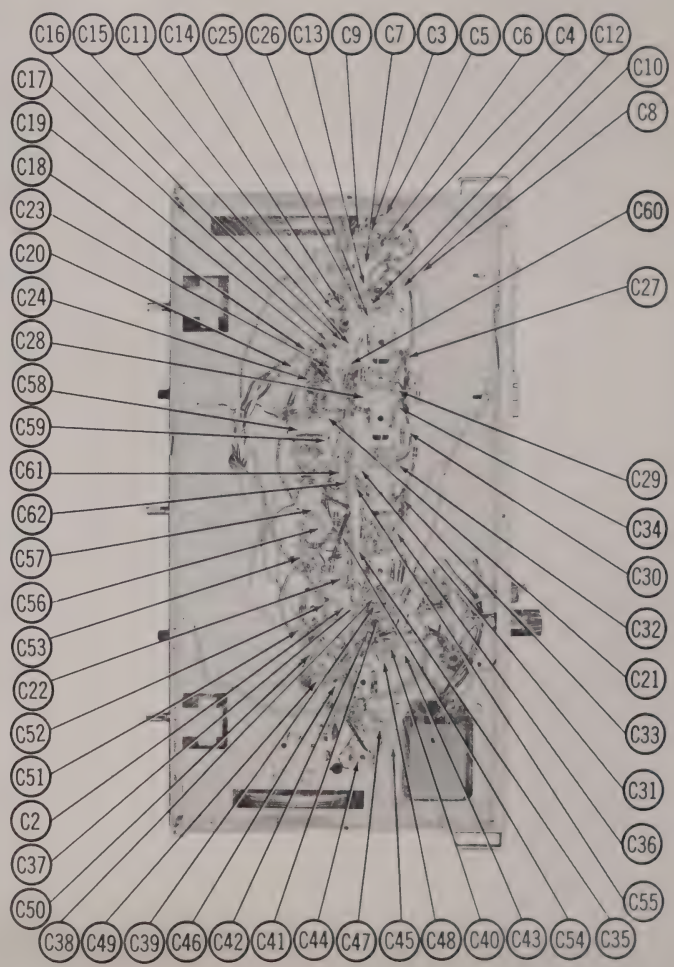
FM RF ALIGNMENT — SELECTOR IN FM POSITION

With FM tuning gang fully open, set FM pointer to right hand dial indexing mark on front of chassis panel. AFC "Off".

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM AND SCOPE	ADJUST	REMARKS
11.	High side thru 270Ω to FM antenna terminal. Low side to chassis.	90MC (45KC Swp.)	(FM) Left hand FM dial indexing mark on front panel of chassis	SCOPE and AC probe of VTVM across FM Output jack.	A20, A21, A22	Adjust for maximum output on VTVM. Use response on scope to be certain the unit is aligned on the correct slope of response.
12.	"	106MC	Second FM dial indexing mark on front panel of chassis.	"	A23, A24, A25	Adjust for maximum output. Repeat Steps 11 and 12.



CHASSIS BOTTOM VIEW-RESISTOR IDENT.



CHASSIS BOTTOM VIEW-CAPACITOR IDENT.

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	FM RF Amplifier	ECC85/6AQ8	V7	Ratio Det. -FM Cath. Foll.	6BN8
V2	FM Mixer	6AB4	V8	AM RF Amplifier	6BA6
V3	FM Osc. -FM AFC	ECC85/6AQ8	V9	AM Converter	6BE6
V4	1st FM IF Amplifier	6AU6	V10	AM IF Amplifier	6BA6
V5	2nd FM IF Amplifier	6AU6	V11	Det. -AVC-AM Cath. Foll.	6BN8
V6	FM Limiter	6AU6	V12	Rectifier	EZ80/6V4

ELECTROLYTIC CAPACITORS

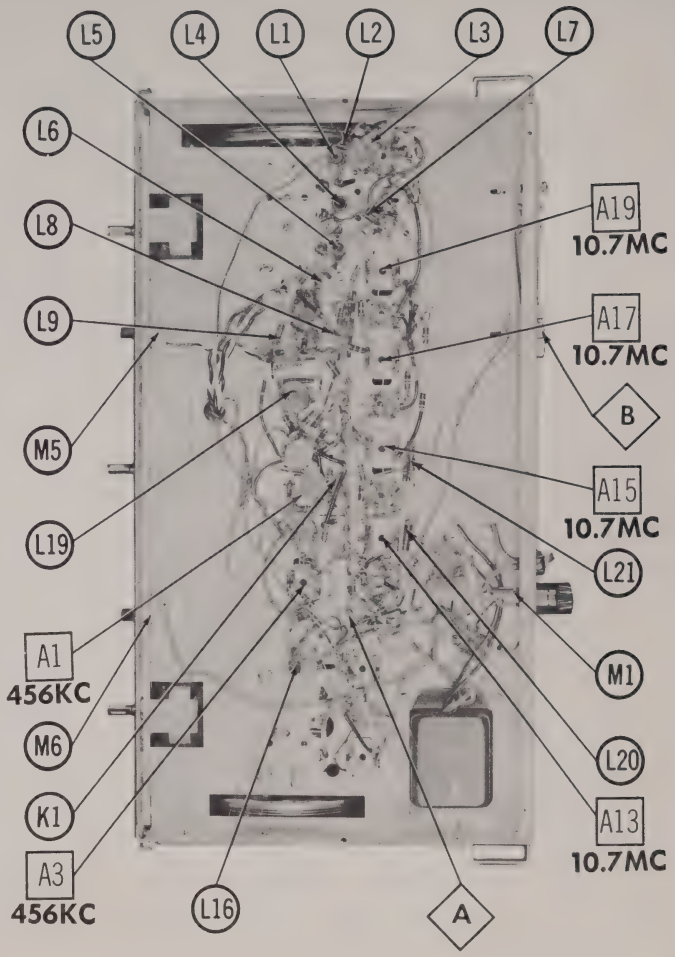
ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	BELL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	▲40	200	23B37	AFH4-01-60		FP327.89	TMQ-4104	TVL-3561.7	
B	■40	200							
C	▲40	200							
C2	10	50	23A45	PTT-50010	NLW10-50	TT50X10	MLV10-50	TE-1304	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	47 N750 10%		N750-DI 47	DTN-47	C10Q47U	CCTN-470	CN7-447	10TCU-Q47
C4	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C5	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C6	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C7	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C8	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C9	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C10	10 N220 10%	#24A132				*		10TCR-Q10
C11	4.7 NPO ± .5mmf		NPO-DI 4.7	DTZ-2R2	C10V47C	CCTO-4R7	CNO-522	10TCC-V47
C12	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C13	47 N750 10%		N750-DI 47	DTN-47	C10Q47U	CCTN-47	CN7-447	10TCU-Q47
C14	2.2 NPO ± .5mmf		NPO-DI 2.2	DTZ-2R2	C10V22C	CCTO-2R2	CNO-522	10TCC-V22
C15	1-7.5	#25A17		829-7				
C16	10 N220 10%	#24A132				*		10TCR-Q10
C17	100 N750 10%		N750-DI 100	DTN-100	C10T1U	CCTN-101	CN7-310	10TCU-T10
C18	680 10%		DI-680	DD-681	5R5T68	CCD-681	GP368	10TS-T68
C19	10 N220 10%	#24A132				*		10TCR-Q10
C20	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C21	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C22	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C23	20 NPO 10%		NPO-DI 20	DTZ-20	C10Q2C	CCTO-200	CNO-422	10TCC-Q20
C24	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C25	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C26	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C27	47 N750 10%		N750-DI 47	DTN-47	C10Q47U	CCTN-470	CN7-447	10TCU-Q47
C28	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C29	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C30	27 NPO 10%			TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
C31	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C32	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C33	47 N750 10%		N750-DI 47	DTN-47	C10Q47C	CCTN-470	CN7-447	10TCU-Q47
C34	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C35	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C36	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C37	270 10%		DI-270	DD-271	L10T27	CCD-271	GP327	10TS-T27
C38	270 10%		DI-270	DD-271	L10T27	CCD-271	GP327	10TS-T27
C39	270 10%		DI-270	DD-271	L10T27	CCD-271	GP327	10TS-T27
C40	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C41	1000 10%		DI-1000	DD-102	5R5D1	CCD-102	GP210	10TS-D10
C42	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C43	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C44	12 NPO 10%			TCZ-12	C10Q12C	CCTO-120	CNO-412	10TCC-Q12
C45	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C46	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C47	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C48	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C49	47 N750 10%		N750-DI 47	DTN-47	C10Q47C	CCTN-470	CN7-447	10TCU-Q47
C50	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C51	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C52	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C53	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C54	100 N750 10%		N750-DI 100	DTN-100	C10T10U	CCTN-101	CN7-310	10TCU-T10
C55	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C56	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C57	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C58	.0047 400V 5%		V84C6D47-5%		1R5D47	CM-20B-472J	MCJ464	MS-247
C59	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C60	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C61	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C62	5000	Note 1	BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50

Bell Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
Note 1. Not used in some versions.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R1	22K			
R2	220K			
R3	100Ω			
R4	2700Ω			
R5	33K			
R6	680Ω			
R7	22K			
R8	1000Ω			
R9	68Ω			
R10	100K			
R11	470Ω			
R12	2.2meg			
R13	100K			
R14	1meg			
R15	5600Ω			
R16	68Ω			
R17	100K			
R18	6800Ω			
R19	100K			
R20	3.3meg			
R21	100K			
R22	47K			
R23	47K			
R24	68Ω			
R25	1meg			
R26	68Ω			
R27	68K			
R28	1500Ω			
R29	1000Ω			
R30	6800Ω			
R31	6800Ω			

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R32	100K			
R33	1meg			
R34	470K			
R35	1500Ω			
R36	100Ω			
R37	470K			
R38	27K			
R39	5600Ω			
R40	10K			
R41	2.2meg			
R42	100K			
R43	180Ω			
R44	270Ω			
R45	1meg			
R46	270K			
R47	56K			
R48	8200Ω			
R49	1meg			
R50	1meg			
R51	1000Ω			
R52	12K			
R53	8200Ω			
R54	1500Ω			
R55	270Ω			
R56	270Ω			
R57	250Ω 5W	PW5-250	5W-SQ-250	
R58	250Ω 5W	PW5-250	5W-SQ-250	
R59	1meg			
R60	1000Ω			
R61	10K			

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	BELL PART No.	REPLACEMENT DATA
K1	AM Audio Filter	100mmf, 100mmf, 47K	57A2	Aerovox PA-97 Centralab PC-50 Sprague D-1

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		BELL PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L1	FM Ant.	31A56					
L2	RF Choke (2uh)	31A59	BC-563	4606	RTC-8517	T857	
L3	RF Choke (1.2uh)	31A55	BC-561	4602	RTC-8515	T855	
L4	FM RF	31A58					
L5	FM Osc.	31A57					
L6	RF Choke (1.2uh)	31A55	BC-561	4602	RTC-8515	T855	
L7	RF Choke (5uh)	31A18	SW-631	4609	RTC-8519	T977	
L8	RF Choke (2.5uh)	31A22	BC-563	4606	RTC-8517	T857	
L9	Fil. Choke (5uh)	31A18	SW-631	4609	RTC-8519	T977	
L10	1st FM IF	32C81	FM-254	1463	RTC-8599	T633	
L11	2nd FM IF	32C81	FM-254	1463	RTC-8599	T633	
L12	3rd FM IF	32C81	FM-254	1463	RTC-8599	T633	
L13	Ratio Detector	32C86	FM-255	1465	RTC-8600	T635	
L14	AM Ant.	32C125					
L15	AM RF	32C126					
L16	AM Osc.	31A50	BC-393	70-OSC	RTC-8647	T512	
L17	1st AM IF	32C99	BC-352	12-C1	RTC-8632	T607	
L18	2nd AM IF	32C99	BC-353	12-C2	RTC-8633	T608	
L19	10KC Filter	31A63					
L20	Fil. Choke (3.8uh)	31A21	BC-564	4608	RTC-8518	T858	
L21	Fil. Choke (3.8uh)	31A21	BC-564	4608	RTC-8518	T858	

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	BELL PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	117V@ .5A	320 VCT @ .070A DC	6.3V@ 4.2A	32B127 ①					① Part #32B130 used in 50 cycle version

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			BELL PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	2A 250V	53A9	53A8	312002 (3AG 2A 250V)	342001	AGC 3	HKP

MISCELLANEOUS

ITEM No.	PART NAME	BELL PART No.	NOTES
M2	Tuning Cap.	25B19	FM, 3 Gang
M3	Tuning Cap.	25B21	AM, 3 Gang (Ant. 14-366mmf, RF 27—266mmf, Osc. 20-127mmf)
M4	Switch	43A89	Function Selector (Rotary Type)
M5	Switch	43A67	AFC (SPDT Slide Type)
M6	Switch	43A92	Power Off-On (SPDT Slide Type)
M7	Meter	46A9	FM Tuning
M8	Meter	46A9	AM Tuning

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Glass	94C71	Dial
Pointer	77A72	Dial
Knob	94A60	Tuning
Knob	84A59	Selector

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

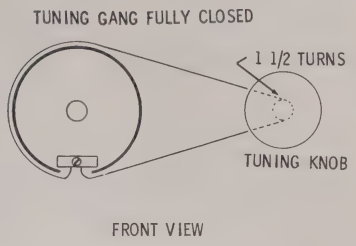
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT® Folder with CIRCUITRACE®

CAPEHART MODEL T6-202

CAPEHART MODEL T6-202

DRIVE CORD STRINGING



FRONT VIEW

CAPEHART MODEL T6-202

TRADE NAME	Capehart Model T6-202
MANUFACTURER	Capehart Corp., 123rd Street, Richmond Hill 18, Long Island, N.Y.
TYPE SET	Battery Operated Transistorized Portable AM Receiver
POWER SUPPLY	9 Volts DC RATING 6 MA @ 9 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	535 – 1640KC 9 MA @ 9 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1, A2, A3, A4. GENERAL CEMENT #8607, 9291, 9294
WALSCO #2520, 2522, 2523, 2524, 2534, 2537
A4, A6.... GENERAL CEMENT #5000, 5003, 5066, 8271, 8272, 8276, 8277, 8290, 8609, 8722, 9150, 9298
WALSCO #2515, 2516, 2518, 2519, 2525, 2541

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Loop	455KC (400∿ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.	"	1600KC	1600KC	"	A4	"
3.	"	600KC	Tune to 600KC Signal.	"	A5	Adjust for maximum output while rocking tuning gang.
4.	"	1400KC	Tune to 1400KC Signal.	"	A6	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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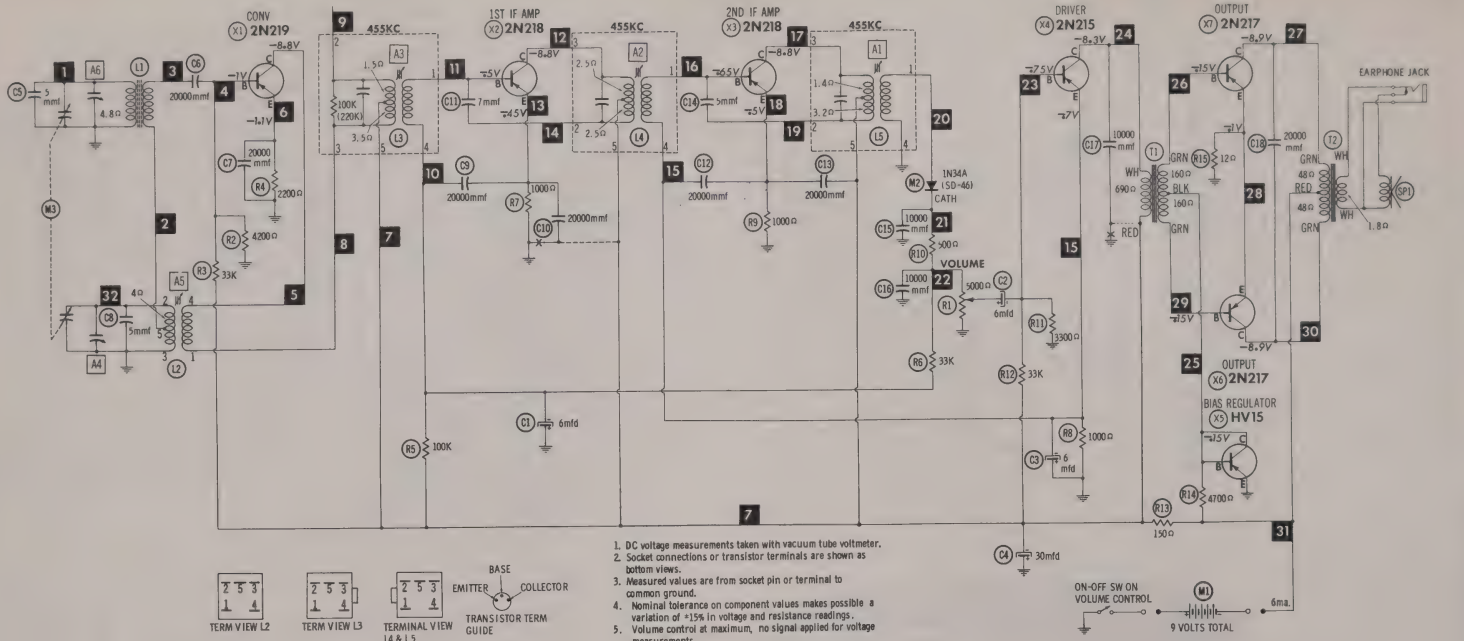
DATE 7 – 61 SET 539 FOLDER 6

SET 539 FOLDER 6



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
with CIRCUITRACE®

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CAPEHART MODEL T6-202

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N219	Converter	2N219	2N486	2N219	PNP
X2	2N218	1st IF Amplifier	2N218	2N483	2N218	PNP
X3	2N218	2nd IF Amplifier	2N218	2N483	2N218	PNP
X4	2N215	Driver	2N406	2N362	2N104	PNP
X5	HV15	Bias Regulator		CK879		
X6	2N217	Output	2N217	2N632	2N217	PNP } Matched
X7	2N217	Output	2N217	2N632	2N217	PNP } Pair

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	CAPEHART PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	6	6			NLW6-15	TT6X5			
C2	6	6			NLW6-15	TT6X5			
C3	6	6			NLW6-15	TT6X5			
C4	30	10		XPP-10030	NLW25-10	TT15X30	ML30-15	TE-1158	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	5		NPO-DI 5.0	DTZ-4R7	C10V5C	CCTO-050	CNO-547	10TCC-V50
C6	20000		C80V203AM	DDM-203	H-05S5		TA-120	TG-S20
C7	20000		C80V203AM	DDM-203	H-05S2		TA-120	TG-S20
C8	5		NPO-DI 5.0	DTZ-4R7	C10V5C	CCTO-050	CNO-547	10TCC-V50
C9	20000		C80V203AM	DDM-203	H-05S2		TA-120	TG-S20
C10	20000		C80V203AM	DDM-203	H-05S5		TA-120	TG-S20
C11	7		NPO-DI 6.8	DTZ-6R8	C10V7C	CCTO-6R8	CNO-568	10TCC-V68
C12	20000		C80V203AM	DDM-203	H-05S2		TA-120	TG-S20
C13	20000		C80V203AM	DDM-203	H-05S2		TA-120	TG-S20
C14	5		NPO-DI 5.0	DTZ-4R7	C10V5C	CCTO-050	CNO-547	10TCC-V50
C15	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10
C16	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10
C17	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10
C18	20000		C80V203AM	DDM-203	H-05S2		TA-120	TG-S20

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	CAPEHART PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	5000Ω	1/4	TV-200A	B16-216				Volume
B	Switch			Not Req.				Power Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R2	4200Ω				R9	1000Ω			
R3	33K				R10	500Ω			
R4	2200Ω				R11	3300Ω			
R5	100K				R12	33K			
R6	33K				R13	150Ω			
R7	1000Ω				R14	4700Ω			
R8	1000Ω				R15	12Ω			

PRINTED BOARD

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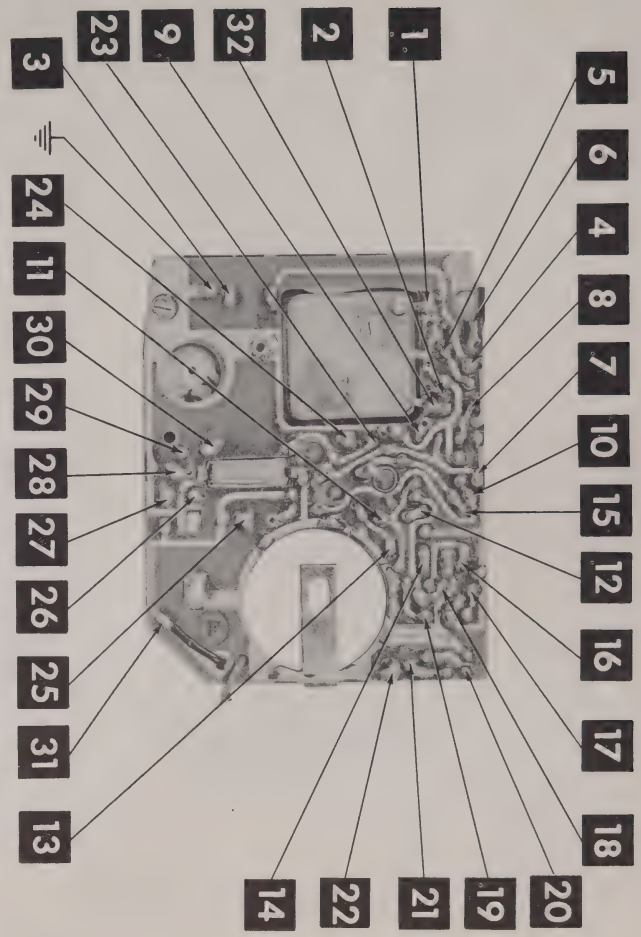


PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		CAPEHART PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L1	Loopstick	670A					
L2	Osc. Coil	X0-81					
L3	1st IF Trans.	8508					
L4	2nd IF Trans.	8503					
L5	3rd IF Trans.	8549					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	CAPEHART PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1	1	TRT-22			TR-38		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	CAPEHART PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	400Ω CT	6-8Ω	TRT-23					

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	CAPEHART PART No.	QUAM PART No.	
SP1	2 1/4"	PM	6-8Ω	PL-230		

BATTERIES

ITEM No.	VOLTAGE	CAPEHART PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	9V			2U6		216		M-1604	

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		CAPEHART PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N34A *			1N34A	1N34A	Detector (Pigtail) * Alternate Type SD-46

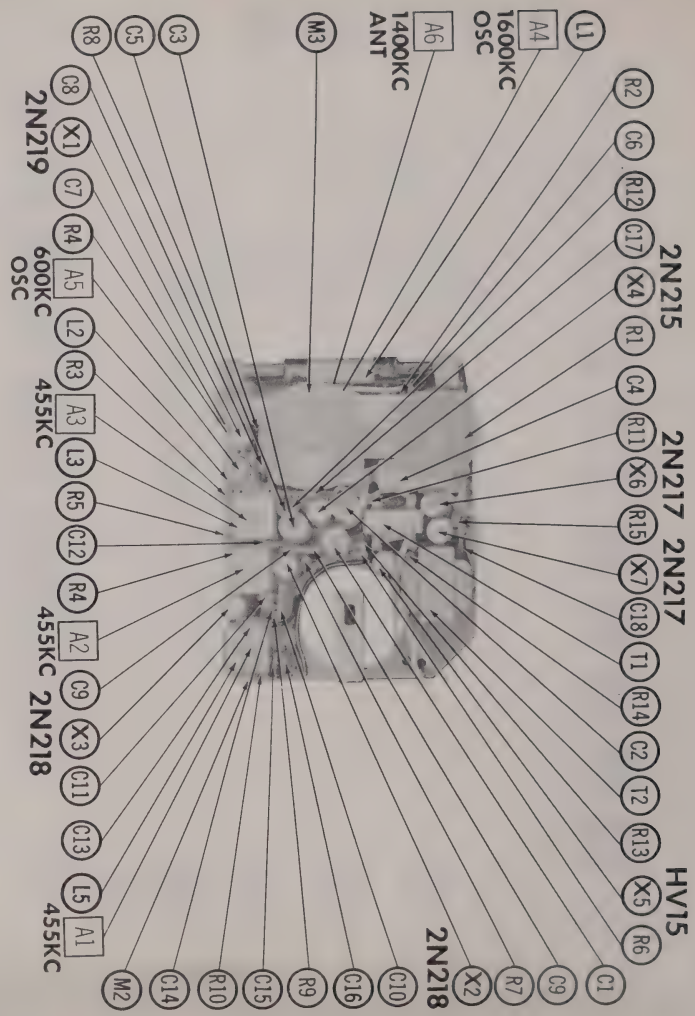
MISCELLANEOUS

ITEM No.	PART NAME	CAPEHART PART No.	NOTES
M3	Tuning Cap.		2 Gang

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



PHOTOFACT® Folder with CIRCUITRACE®

CHANNEL MASTER MODEL 6505

CHANNEL MASTER MODEL 6505

CHANNEL MASTER MODEL 6505

TRADE NAME	Channel Master Model 6505		
IMPORTER	Channel Master Corp., Ellenville, N. Y.		
TYPE SET	Battery Operated Transistorized AM Receiver		
POWER SUPPLY	6 Volts DC	RATING	10MA @ 6 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	540 — 1600KC		20MA @ 6 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .1mfd to antenna stator lug of tuning gang. Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2	Adjust for maximum output.
2.	Loop	1650KC	"	"	A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	530KC	Tuning gang fully closed.	"	A4	"
4.	"	1400KC	1400KC Signal.	"	A5	"
5.	"	600KC	600KC Signal.	"	A6	Adjust for maximum output. Repeat Steps 2, 3, 4 and 5.

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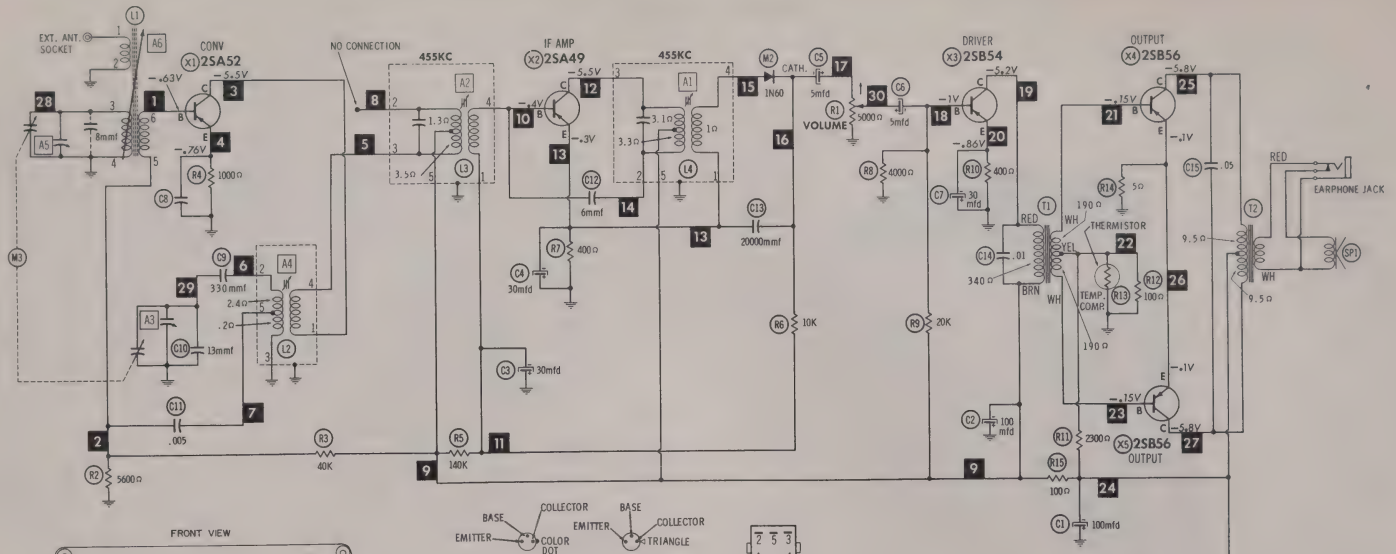
SET 539 FOLDER 7



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

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CHANNEL MASTER MODEL 6505

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2SA52	Converter				PNP
X2	2SA49	IF Amplifier				PNP
X3	2SB54	Driver	2N406			PNP
X4	2SB56	Output	2N408			PNP } Matched
X5	2SB56	Output	2N408			PNP } Pair

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Channel Master PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	100	6	A029	BCD6100	ECPB117	PET1400	MLV100-6	VL-1100	
C2	100	6	A029	BCD6100	ECPB117	PET1400	MLV100-6	VL-1100	
C3	30	6	A009	BCD6035	ECPB412	PET1960	MLV30-6	VL-1092	
C4	30	6	A009	BCD6035	ECPB412	PET1960	MLV30-6	VL-1092	
C5	5	6	A010	PTT-6005	NLW5-15	TT6X5	MLV5-6	TE-1084	
C6	5	6	A010	PTT-6005	NLW5-15	TT6X5	MLV5-6	TE-1084	
C7	30	6	A009	BCD6035	ECPB412	PET1960	MLV30-6	VL-1092	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	.01 150V		P288N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C9	330 10%			D6-331	L10T33	CCD-331	GP330	10TS-T33
C10	13		DI-12	DD-120	C10Q13C	CCD-120	GP412	10TS-Q12
C11	.005 150V		P288N-005	D6-502	CUB6D5	6DP-1-502	GEM-625	6TM-D50
C12	6			DD-060	C10V6C			10TS-V60
C13	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C14	.01 150V		P288N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C15	.05 100V		P288N-05	DD-503	CUB2S5	4DP-3-503	GEM-415	2TM-S50

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Channel Master PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	5000Ω	½	E022					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA			REMARKS
		IRC PART No.	WORKMAN TV PART No.		
R2	5600Ω				
R3	40K				
R4	1000Ω				
R5	140K				
R6	10K				
R7	400Ω				
R8	4000Ω				

ITEM No.	RATING	REPLACEMENT DATA		REMARKS
		IRC PART No.	WORKMAN TV PART No.	
R9	20K			
R10	400Ω			
R11	2300Ω			
R12	100Ω			
R13	Temp. Comp.			Pt. #F150
R14	5.0Ω			
R15	100Ω			

PRINTED BOARD

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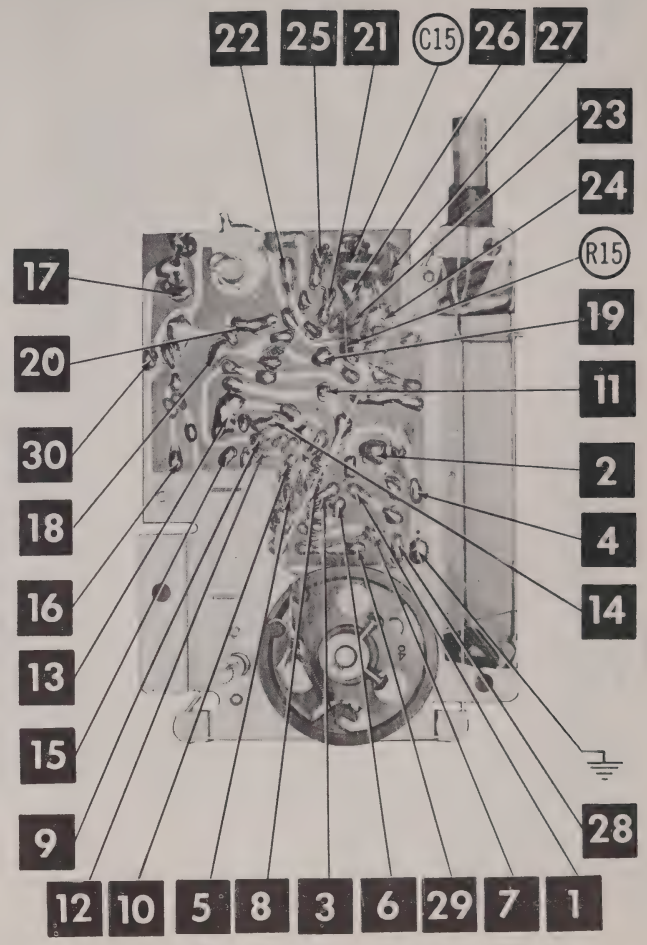


CHANNEL MASTER MODEL 6505

FOLDER 7

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		Channel Master PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L1	Loopstick	E013					
L2	Osc.	F189					
L3	Input IF	C033					
L4	Output IF	C034					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	Channel Master PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1, 2	1	C031					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	Channel Master PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	200Ω CT	3-4Ω	C032					

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Channel Master PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	G095	4A07	

BATTERIES

ITEM No.	VOLTAGE	Channel Master PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V			130 *		635 *		M-14R*	* 4 Required

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Channel Master PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N60	F136		1N60	1N60	Detector

MISCELLANEOUS

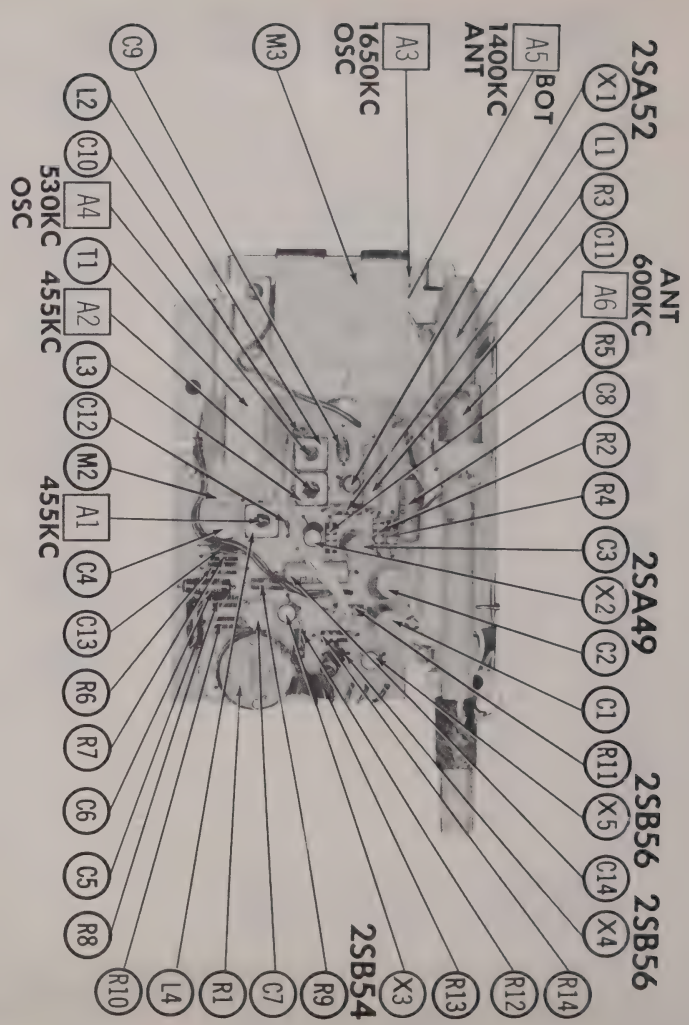
ITEM No.	PART NAME	Channel Master PART No.	NOTES
M3	Tuning Cap.	A019	2 Gang

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Pointer	F188	Dial
Knob	F027	Tuning, Volume
Cabinet	G015	Complete
Cabinet	G016	Front Section
Cabinet	G017	Rear Section
Handle	F025	

CHASSIS—TOP VIEW



PHOTOFACT® Folder

CONCORD
MODEL 103

CONCORD
MODEL 103

CONCORD
MODEL 103

GENERAL INFORMATION

The Concord Model 103 is a three-speed, dual-track tape recorder.

Recordings can be made directly from a microphone and from a radio, phonograph, or television receiver.

The three tape speeds are 1 7/8, 3 3/4 and 7 1/2 ips. The playing and recording time using both tracks are as follows:

Reel Size	1 7/8 ips	3 3/4 ips	7 1/2 ips
3" (300 ft.)	1 hour	1/2 hour	1/4 hour
5" (600 ft.)	2 hours	1 hour	1/2 hour

Connect recorder to an outlet supplying 110-120 volts, 60 cycles AC only. Before connecting to line supply, be certain it agrees with these specifications.

Supplied By:

Concord Electronics Corp.
1549 North Vine Street
Los Angeles, California

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

EIA MEMBER

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1961 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

CQ480

PREPARING FOR OPERATION

1. Remove the lid from the case.
2. Remove the AC cord and accessories from the accessory bag.
3. Plug the AC cord into a convenient outlet of proper power rating.
4. Recorder is now ready for use. Before operating, the operator should familiarize himself with the function of the controls.

FUNCTION OF CONTROLS

On-Off-Volume

Turn knob clockwise to turn the power on to the unit. Further rotation increases the volume during playback. When recording, it controls the recording level.

Selector

1. The tape motion is stopped when the Selector is in the "Stop" position.
2. Turning the Selector counterclockwise places the unit in "Rewind" position.
3. Turning the Selector clockwise from the Stop position places the unit in "Forward" or Play position.
4. To Record, pull the "REC." lever toward you, then turn the Selector control to the "Forward" position. ("REC." lever is located to the right of Selector knob).

Fast Forward

Turn Selector to Forward (Play) position and then move the Fast Forward lever toward the front of the case to advance the tape rapidly.

Quick Stop

When the lever is pulled toward the front of the case it will stop the forward motion of the tape temporarily without turning off the amplifier or motor circuits.

REC. Safety

To record, move the REC. Safety Lever toward the front of the case before turning the Selector control to the Forward position. This is a Safety Lock to prevent the recorder from being placed in the Record position accidentally.

Speed Selector

To place the unit in 7 1/2 ips speed, move the selector toward the rear of the recorder. For 3 3/4 ips speed, move the lever toward the front of the recorder. For 1 7/8 ips, leave the selector in the 3 3/4 ips position. Remove the 7 1/2 ips capstan roller (115) and place it on the capstan holder.

NOTE: Replace the capstan roller on the capstan when recording 3 3/4 ips or 7 1/2 ips.

Earphone Jack

The Earphone may be plugged into this jack for monitoring a recording or for listening to the playback of a recording.

"Ext." Output Jack

This jack is provided for playing the recorder through an external speaker, radio, or Hi Fi amplifier.

"Aux." Radio-Phono Input Jack

This jack is used when recording from a radio, phonograph, or TV.

"Mic." Input Jack

This jack is used when making recordings with the microphone.

OPERATING INSTRUCTIONS

Threading the Tape

1. Move the Selector control to the "Stop" position.
2. Place a reel of tape on the left-hand reel spindle (76).
3. Place an empty reel on the right-hand reel spindle (15).
4. Unwind about 12" of tape from the reel. Hold a section taut and insert it in the tape slot. Make sure the dull-coated side faces the rear of the recorder.
5. Insert the free end of the tape into one of the radial slots of the right-hand spindle reel. Turn the reel several turns counterclockwise to fasten the tape to the reel and to take up slack between reels.

Recording from Microphone

1. Rotate the On-Off-Volume control clockwise to turn the recorder on. Allow sufficient time for the tubes to warm up.
2. Insert the microphone plug into the "Mic." jack.

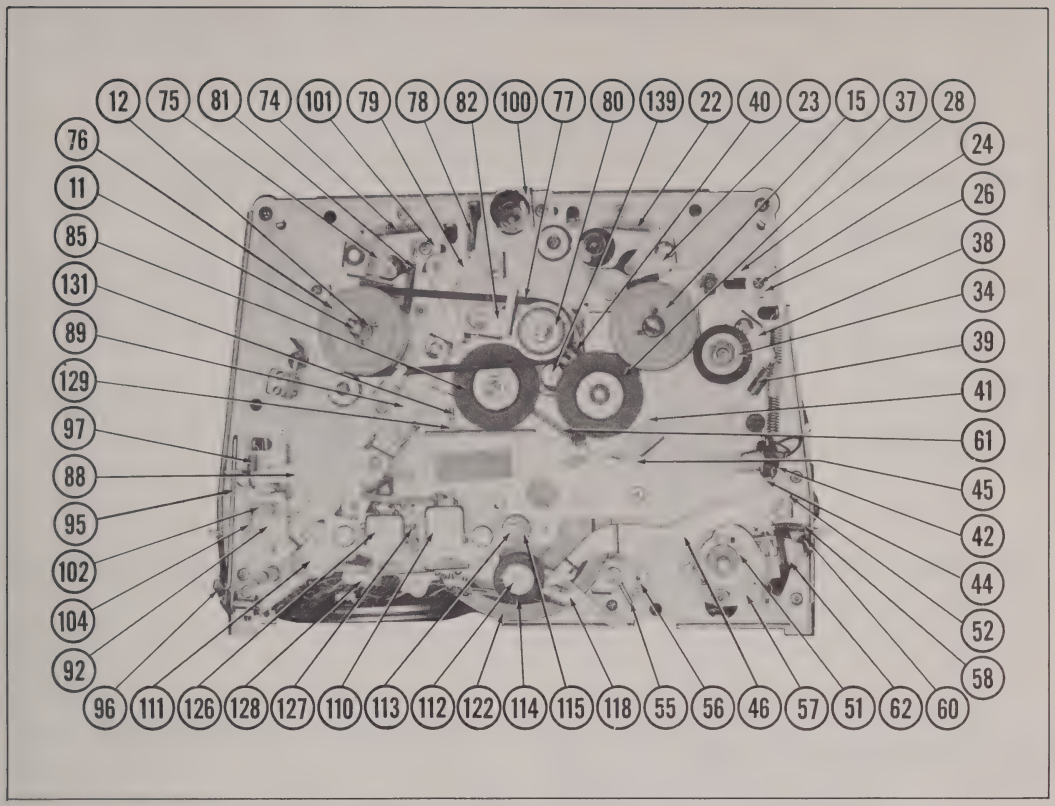


FIG.1 TOP VIEW OF MECHANISM WITH TOP COVER REMOVED

3. Set the speed selector for the desired speed 7 1/2, 3 3/4, or 1 7/8 ips.

4. Pull the "REC." lever toward the front of the case and move the Selector control to the Forward position.

5. Hold the microphone about 6 to 12 inches from the mouth and speak in a normal voice.

6. Adjust the Volume control until the level indicator flashes on the loudest passages.

NOTE: Correct volume level during a recording is very important. Too weak a signal will result in weak playback and high background noise. Too strong a signal will result in distortion during playback.

Recording from a Radio, Phonograph or Television Receiver

Connect the patch cord supplied with the recorder as follows:

1. Connect the alligator clips across the voice coil terminals of the radio, phonograph, or television receiver.

2. Insert the patch cord plug into the Aux. jack.

3. Follow steps 1 thru 4 under "Microphone Recording".

Recording from Cartridge

1. Magnetic Cartridge:

   (a) Connect the output of the cartridge to a preamplifier.

   (b) Connect the preamplifier output to the "Aux." jack of the recorder.

   (c) Follow steps 1 thru 4 under "Microphone Recording".

2. Crystal or Ceramic Cartridge:

   (a) Connect the cartridge leads through the patch cord to the "Aux." jack of the recorder.

   (b) Follow steps 1 thru 4 under "Microphone Recording".

Dual Track Recording

This recorder will record and play on one-half the width of the tape at a time, resulting in a two-track recording. After the first recording is completed, remove the full reel from the right-hand spindle, turn the reel over and place it on the left-hand spindle.

Then make another recording. The tape can be played back in the same manner.

Rewind

To rewind the tape at a rapid speed turn the Selector control to Rewind position.

To Play a Recording

1. Thread the tape as described under "Threading the Tape".
2. Turn the Selector control to the Forward (Play) position.
3. Adjust the volume to the desired listening level.

To Erase a Recording

Any recording on tape is automatically erased before a new one is made when in the record position.

To erase a recording without putting new material on the tape, follow the normal recording procedure but set the volume control to the full counterclockwise position.

To Edit and Splice Tape

NOTE: It is impossible to edit and splice one track tape without effecting the other. Recordings to be edited should be limited to one track recordings only.

1. Tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements can be inserted between selections, etc. Unused tape can be spliced for reuse.
2. For best results, cut tape at a slight diagonal, butt ends together and fasten on the glossy side with splicing tape. Trim off any excessive width.

DISASSEMBLY

To Remove Recorder from Case

1. Remove all control knobs.
2. Remove head covers (4 & 5).
3. Remove the four rubber feet on the bottom of the case.
4. Lift the bottom cover from case.
5. Remove one long brass colored phillips head screw from front part of the chassis.
6. Remove three other phillips head screws from chassis.
7. Lift recorder from case.
8. To reassemble, reverse the foregoing procedure.

CLEANING

The record head (110), erase head (126), capstan (115), pinch roller (114), and tape guides (106) should be cleaned occasionally to remove the tape residue which is worn off the tape as it passes these parts. Use a soft cloth and alcohol to remove the residue.

Clean the rubber tired idler wheels and belts with alcohol.

LUBRICATION

All rotating parts are provided with oilite bearings and are lubricated before leaving the factory. Under normal use, no lubrication is required for a long period of time. When lubrication is necessary, use a good grade of oil sparingly.

When lubricating the flywheel bearing, remove the capstan (115) and inject 4 or 5 drops of oil.

ADJUSTMENTS

Idler Wheel

To adjust the idler wheel pressure, set the speed selector to 3 3/4 ips. Hook a spring scale to the end of the idler lever (89) and pull until the idler is lifted away from the motor pulley. The spring (61) should be adjusted so that there is between 9 and 12 ounces of pull.

The idler wheel height is adjusted by moving the motor pulley up or down as required. In the 3 3/4 ips position the distance between the lower surface of the idler wheel and the step of the motor pulley should be 3/32". In the 7 1/2 ips position the distance between the upper surface of the idler wheel (85) and the step of the motor pulley (139) must be around 1/32".

Tape Speed and Pinch Roller

(a) Tape Speed — Set the Speed Lever to 7 1/2 ips, and the Selector control to the Forward position. Adjust the hex nut (129) clockwise to increase speed, and counterclockwise to decrease speed.

After adjustment is made, check the 1 7/8 and 3 3/4 ips speeds.

(b) Pinch Roller — To check the pressure of the Pinch Roller (114), set the controls as described under "Tape Speed".

Measure the tension of the pinch roller by hanging the hook of a spring scale to the pinch roller shaft, pull on the scales until

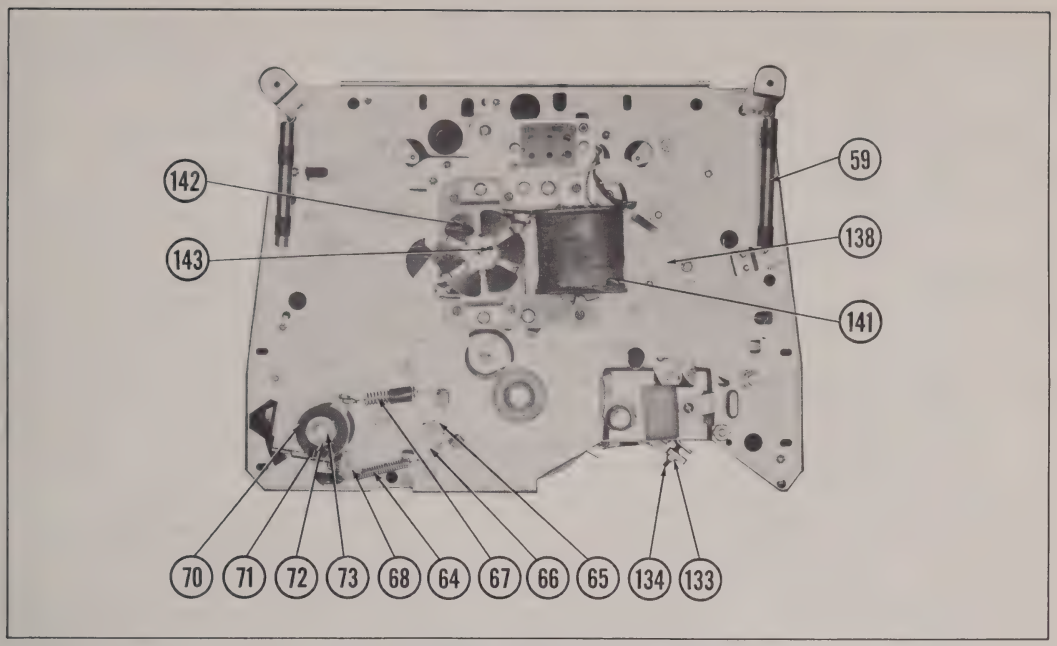


FIG.2 BOTTOM VIEW OF MECHANISM

the pinch roller (114) is lifted away from the Capstan (115), the tension should be between 1 and 2 pounds.

If adjustment is necessary turn the hex nut (129) clockwise to increase tension and counterclockwise to decrease tension. If adjustment was made, the "Tape Speed Adjustment" must be checked.

Pressure Pad

Set the Selector control to Forward Position and turn the Fast Forward lever to Fast Forward.

Adjust the position of the pressure pad retainer (128) by turning retaining screw (134) so the proper distance between the front surface of the pads and the heads (110 and 126) is 1/4". Tighten hex nut (133).

Adjust the angle of lug (124) so pads are parallel to the heads (110 and 126).

Record Switch Arm

When the Recorder is in the record mode the record switch arm (62) is locked against the switch lock arm (52).

The distance between the outer edge of the record switch arm (62) and the switch lock arm (52) protrusion, should be about 1/64 to 3/64 inch.

Adjust screw (68) located on the switch lever (69) and lock it in place with the adjustment nut.

Play-Record Head

Thread a good prerecorded tape on the recorder.

While playing back, adjust the head mounting screws for the proper position of the head which will give maximum output. The adjusting screws must be tight when adjustment is completed.

Erase Head

The erase head (126) should be adjusted so that it effects just the top half of the recorded tape.

This adjustment should be made in Record position. Loosen the erase head adjusting screws, and adjust head to a position where only the top half of the tape will be erased. The adjusting screws must be tight when adjustment is completed.

Record Bias Adjustments

Set the Selector to Record position and tape speed for 3 3/4". Adjust A1 for 45 volts RMS across the Record/ Play head.

Bias Frequency Adjustment

Set the Selector to Record position and adjust A2 for bias frequency of 30KC $\pm$ 2KC.

Record Level Indicator Adjustment

Inject a 1000 cycle signal into either Input jack with the Selector set to Record. Adjust R2 until the neon lamp lights with 11 to 15 volts of signal level at pin 6 (plate) of V2 (12AU7).

TROUBLE CHART

Symptom	Cause	Remedy
Tape Speed too fast.	1. Voltage selector plug in wrong jack. 2. Frequency selector plug in wrong jack. 3. Pinch Roller spring (132) misadjusted.	1. Insert plug in 117V jack. 2. Insert plug in 60 cycle jack. 3. See "Pinch Roller Adjustment" under "Adjustments".
No Rewind.	1. Drive belt (77) broken. 2. Rewind spring (81) broken or disconnected. 3. Motor pulley (139) loose on its shaft.	1. Replace drive belt (77). 2. Connect or replace rewind spring (81). 3. Tighten set screw (140) on motor pulley (139).
No Record or Playback.	1. Play-record head (110) defective. 2. Pinch Roller Spring (132) disconnected or broken.	1. Replace Play-record head (110). 2. Connect or replace Pinch Roller spring (132).
No Erase	1. Erase head (126) defective. 2. Erase head (126) positioned wrong.	1. Replace erase head (126). 2. Position erase head (126) so it is parallel with the tape when in Record position.
Rewind spindle brake inoperative.	1. Rewind brake spring (22) disconnected or broken.	1. Connect or replace rewind brake spring (22).
Takeup spindle brake inoperative.	1. Takeup brake spring (74) disconnected or broken.	1. Connect or replace takeup brake spring (74).
Selector switch operates too freely.	1. Interlock spring (54) disconnected or broken.	1. Connect or replace interlock spring (54).

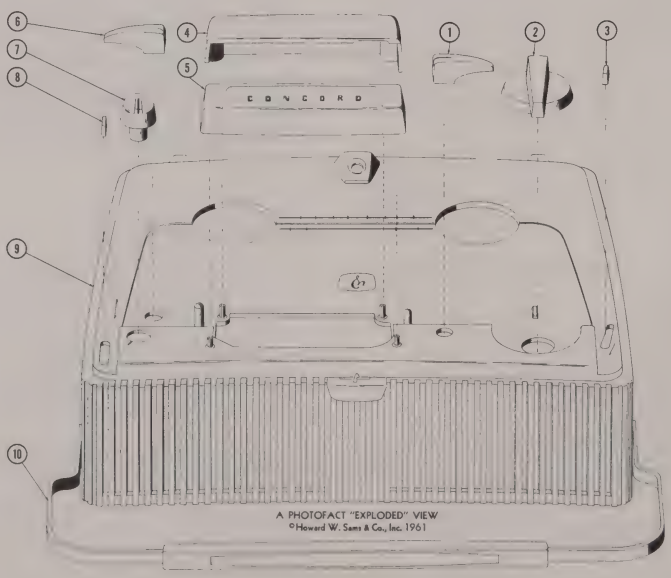


FIG.3A EXPLODED VIEW OF MECHANISM

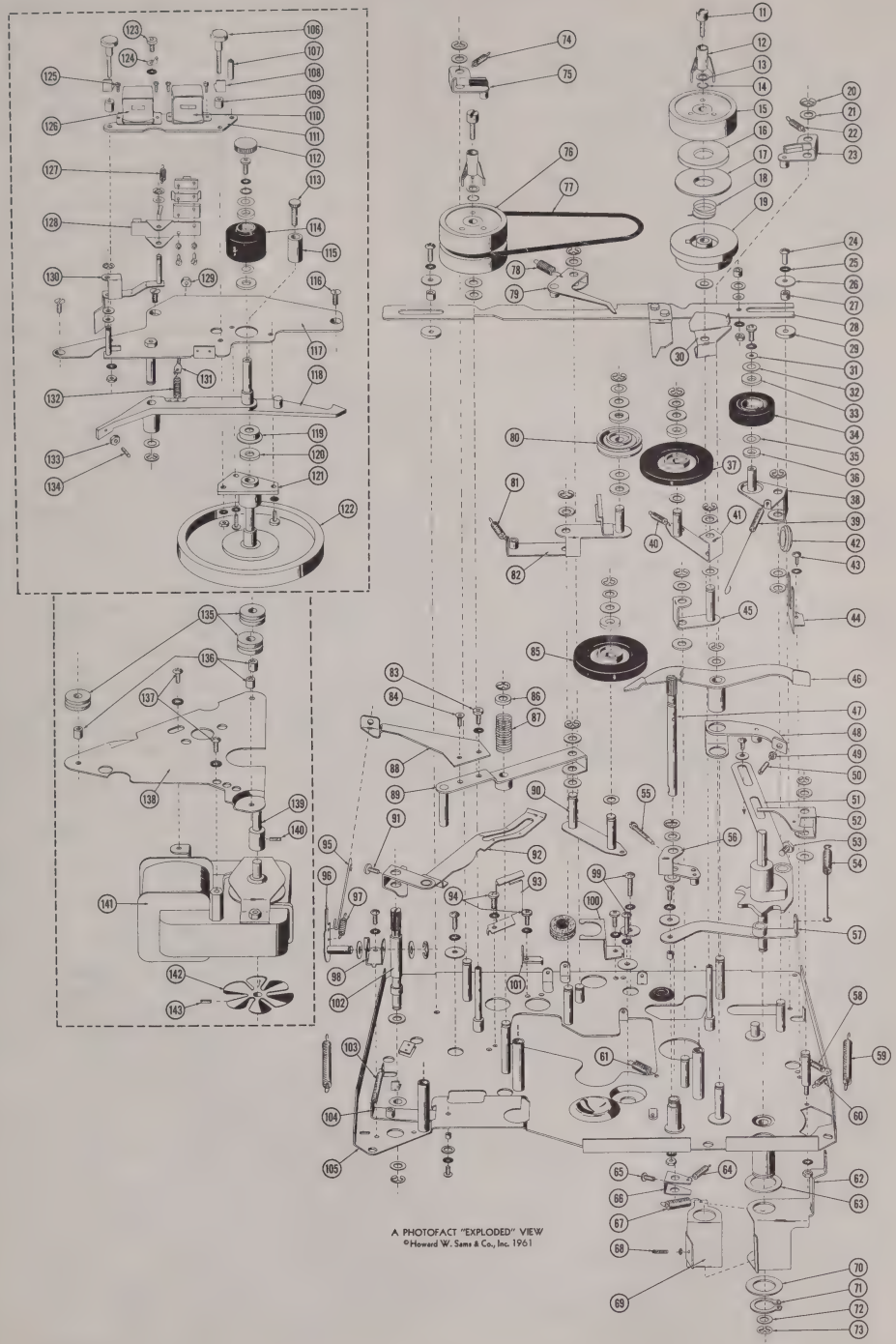
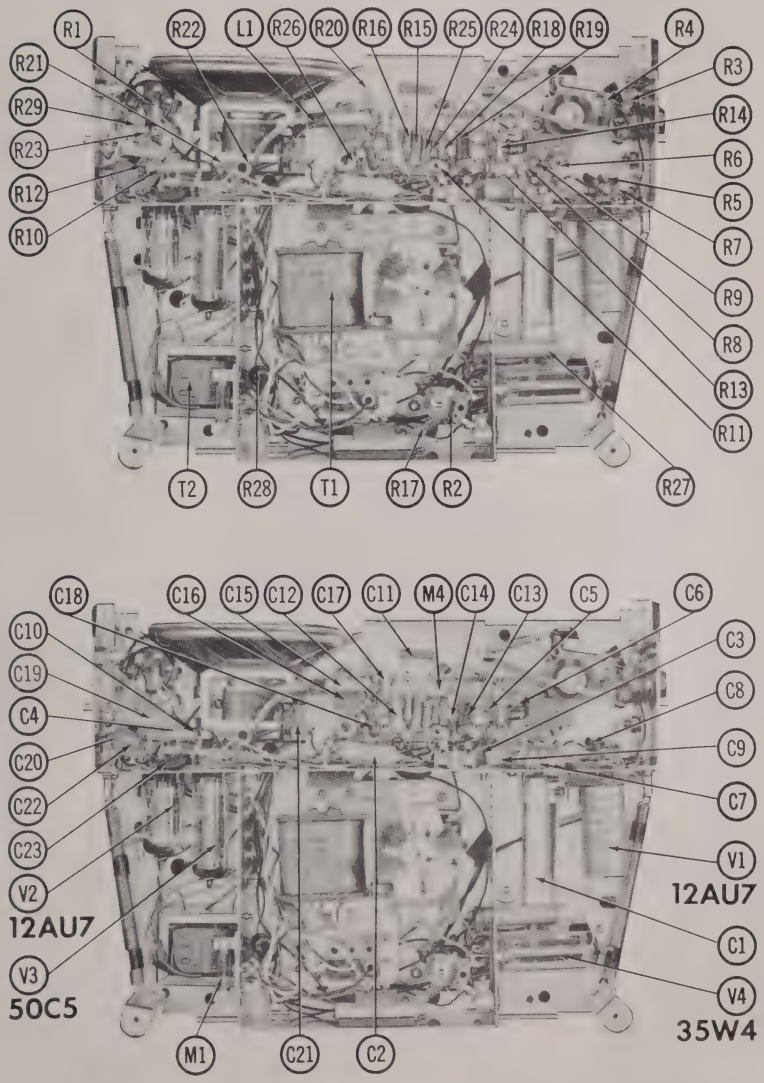


FIG. 3A EXPLODED VIEW OF CABINET

Ref. No.	Part No.	Description
1	A-81152	Fast Forward Lever Knob
2	A-81151	Selector Knob
3	A-81154	Record Safety Knob
4	A-81139	Head Cover (Rear)
5		Head Cover (Front)
6	A-81152	Speed Selector Knob
7	A-81153	On/ Off Volume Control Knob
8	A-81154	Quick-Stop Knob
9	A-81140	Cabinet
10		Handle Assembly
11	A-67397	Reel Spindle Screw
12	A-81055	Reel Holder
13		Washer
14		Lock Washer
15	A-81059-B	Takeup Spindle
16	A-85151	Friction Felt
17	A-64887	Friction Disc
18	A-70048	Friction Spring
19	A-81145	Takeup Reel Drive Spindle
20		"E" Type Retainer
21		Phenolic Washer
22	A-70075	Brake Spring
23	A-65382	Takeup Brake Lever
24		Screw
25		Shake-proof Washer
26		Flat Washer
27	A-67464	Spacer
28	A-65376	Selector Slide
29		Fiber Washer
30		Takeup Brake Cam
31		Washer
32		Phenolic Washer
33		Felt Washer
34	A-48112	Fast Forward Roller
35		Phenolic Washer
36		Felt Washer
37	A-48110	Idler Wheel
38	A-65385-A	Fast Forward Roller Lever
39	A-70143	Fast Forward Spring
40	A-70057	Rewind Spring
41	A-65379	Takeup Arm
42	R-83603	Rubber Bushing
43		Screw
44	A-65398-A	Pilot Lamp Retaining Brkt.
45	A-65380	Takeup Arm
46	A-65381	Stop Lever
47	A-67689	Fast Forward Lever Shaft
48	A-65407	Stop Arm
49		Hex Nut
50		Retaining Screw
51	A-65401	Selector Rod
51A	A-67685	Selector Cam
51B	A-67687	Selector Shaft
52	A-65397	Switch Lock Arm
53		Hex Bolt
54	A-70133-A	Interlock Spring
55	A-67682	Stopper Screw
56	A-65386	Fast Forward Lever
57	A-65384	Interlock Arm
58	A-70071-B	Pad Spring
59		Handle Spring
60	A-70057	Record Switch Arm Spring
61	A-70057	Idler Arm Spring
62	A-65396	Record Switch Arm
63		Fiber Washer
64		Fast Forward Turning Spring
65		Fast Forward Turning Screw
66	A-65415	Fast Forward Turning Lever
67	A-70126-C	Switch Lever Spring
68		Switch Lever Retaining Screw
69	A-65428-A	Switch Lever
70		Fiber Washer
71		Retainer
72		Fiber Washer
73		"E" Type Retainer
74	A-70075	Brake Spring
75	A-65383	Rewind Brake Lever
76	A-81146	Rewind Spindle
77	A-83063	Belt
78	A-70057	Separator Lever Spring
79	A-65390	Separator Lever
80	A-48090	Rewind Pulley
81	A-70057	Rewind Spring
82	A-65400	Rewind Lever
83		Screw
84		Screw
85	A-48110	Idler Wheel
86	A-65062	Spring Retainer
87	A-70104	Speed Selector Spring
88	A-65434	Quick-Stop Supporter Lever
89	A-65378	Idler Lever
90	A-65377	Idler Arm
91		Screw
92	A-65394	Speed Selector Slide
92A	A-65395	Speed Selector Lever
93		Belt Guide
94		Screws
95	A-65405	Quick Stop Connector
96	A-65389	Quick-Stop Lever
97	A-70057	Quick-Stop Lever Spring
98	A-65403	Quick-Stop Lever Holder
99		Screws
100	A-65430	Neon-Lamp Retaining Brkt.
101	A-65368	Spring Bracket
102	A-67688	Speed Selector Shaft
103	A-70075	Stepper Spring
104	A-65404	Stepper for Speed Selector
105	A-65374-B	Base Plate
106	A-67680	Tape Guide
107	A-67393	Capstan Holder
108	A-65402	Tape Guide
109	A-67696	Tape Guide Spacer
110	A-46030	Record-Play Head
111	A-65393	Head Retaining Board
112	A-67698	Pinch Roller Cap
113	A-67674	Capstan Retaining Screw
114	A-48111	Pinch Roller
115	A-68109	Capstan (for 60 cycle)
116		Screw
117	A-65375	Head Retaining Board
118	A-67684-A	Pinch Roller Lever
119	A-65325	Oil Cap
120	A-85490	Felt Washer
121	A-67686	Flywheel Bearing
122	A-48106	Flywheel
123		Screw
124		Spring Retaining Lug
125		Head Screws
126	A-46028	Erase Head
127	A-70134-A	Pad Spring
128	A-65387	Pressure Pad Retainer
129		Hex Nut
130	A-65388	Pressure Pad Arm
131	A-65429	Spring Adjusting Screw

Ref. No.	Part No.	Description
132	A-70122	Pinch Roller Spring
133		Hex Nut
134		Retaining Screw
135	A-83062	Shock Absorbing Rubber Cushion
136	A-67679	Shock Absorbing Rubber Spacer

Ref. No.	Part No.	Description
137		Screw
138	A-65392	Motor Retaining Board
139		Motor Pulley
140		Motor Pulley Set Screw
141	A-48105	Motor
142		Motor Fan
143		Motor Fan Set Screw



AMP CHASSIS-BOTTOM VIEW

CONCORD MODEL 103

FOLDER 8

ELECT. PARTS LIST AND DESCRIPTIONS

TUBES

◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	AF Amplifier	12AU7	V3	Output-Bias Osc.	50C5
V2	AF Amplifier	12AU7	V4	Rectifier	35W4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	CONCORD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	40	150	G-25017	PRS2195	BBRD4415	TCD48	TDLD-7	TVA-2445	
B	40	150							
C2	5	150		SRE150V5	NLW5-150	TC40	TD-4-150	TVA-1403	
C3	5	150		SRE150V5	NLW5-150	TC40	TD-4-150	TVA-1403	
C4	30	6		PTT27	NLW30-6	TT6X30	MLV30-6	TE-1092	

FIXED CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	150 5%		NPO-SI 150	TCZ-150	22R5T15	CM-19B-151J	CNO-315	MS-315
C6	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C7	.0033 400V		P488N-0033	D6-332	CUB6D33	6DP-1-332	GEM-6233	6TM-D33
C8	.0022		SI 2200	D6-222	BYA10D22	CCD-222	B-222	5HK-D22
C9	.033 400V		P488N-033	DD-303	CUB6S33	4DP-2-333	GEM-4133	6TM-S33
C10	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C11	330 10%			D6-331	L10T33	CCD-331	GP333	10TS-T33
C12	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S10
C13	68 10%		NPO-SI 68	D6-680	L10Q68	CCD-680	GP468	10TS-Q68
C14	420 3%					CM-15E-431G		MS-343
C15	.004 400V		P488N-004	D6-402	CUB6D4	6DP-1-402	GEM-624	6TM-D40
C16	.0047 10%		1464-0047		1R5D47	CM-19B-472K	MCJ464	10TS D47
C17	.0022 400V		P488N-0022	D6-222	CUB6D22	6DP-1-222	GEM-6222	6TM-D22
C18	.001		SI 1000	D6-102	BYA10D1	CCD-102	B-210	5HK D10
C19	.0047 400V		P488N-0047	D6-472	CUB6D47	6DP-1-472	GEM-6247	6TM-D47
C20	.0033 400V		P488N-0033	D6-332	CUB6D33	6DP-1-332	GEM-6233	6TM-D33
C21								
C22	.0047		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	5HK-D47
C23	.0047		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	5HK-D47

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	CONCORD PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	500K	½	G36203	AB-60				Volume
B	Shaft			AK-29				
C	Switch			KR-2				Power Off-On
R2	65K	½	G-36215					Indicator Level Adjust

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R3	470K				R9	100K			
R4	22K				R10	1000Ω 5%			
R5	3.3meg				R11	100K			
R6	100K				R12	470K			
R7	3.3meg				R13	200Ω			
R8	100K				R14	1000Ω			

RESISTORS (cont)

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No	WORKMAN TV PART No	REMARKS
R15	100K				R23	10K			
R16	220K				R24	220K			
R17	100K				R25	56K			
R18	33K				R26	3300Ω			
R19	150K				R27	250Ω 2W			
R20	10K				R28	5Ω 2W			
R21	470K				R29	33K			
R22	180Ω								

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		CONCORD PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L1	Bias Osc.	G16031					

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	CONCORD PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No	
T1	117V ⓐ .56A Tap ⓐ 100V ⓐ .150ADC Tap ⓐ 10V	120V ⓐ .040A Tap ⓐ 15V		①					① Used for Drive Motor

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	CONCORD PART No.	QUAM PART No.	
SP1	4"	PM	8-10Ω	A-45225	4A07RZ9	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			CONCORD PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1		2A						

MISCELLANEOUS

ITEM No.	PART NAME	CONCORD PART No.	NOTES
M2	Head	A46028	Erase
M3	Head	A46030	Record-Play
M4	Switch	A42533	Record-Play (Slide Type)
M5	Switch	A42203	Equalizer (Leaf Type)
M6	Switch	A42203	Muting (Leaf Type)

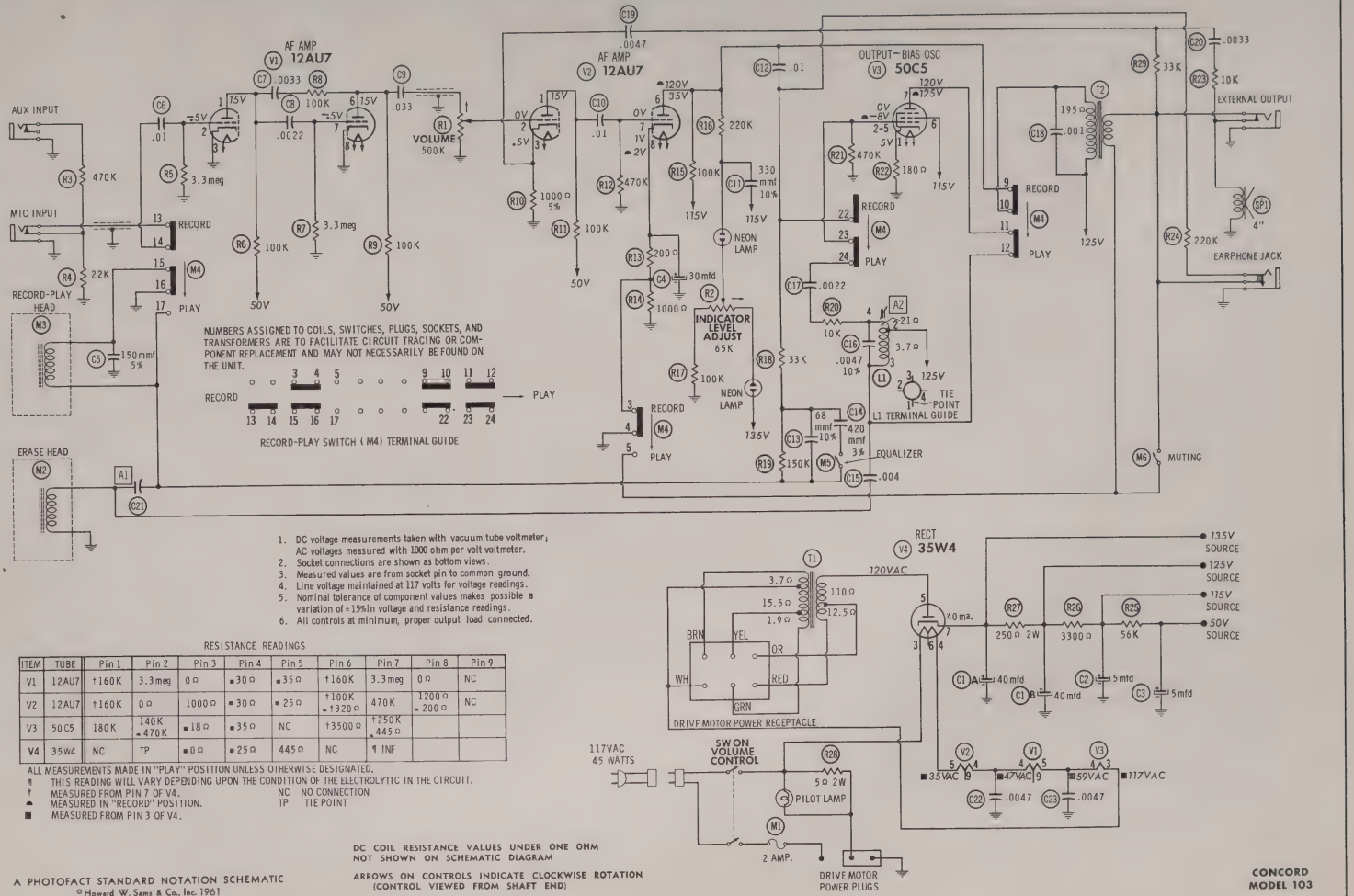
WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

Low-Loss Shielded Lead (Interconnecting) ..... Use BELDEN No. 8401

Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AU7	†160K	3.3meg	0Ω	■30Ω	■35Ω	†160K	3.3meg	0Ω	NC
V2	12AU7	†160K	0Ω	1000Ω	■30Ω	■25Ω	†100K ▲†320Ω	470K	1200Ω ▲200Ω	NC
V3	50C5	180K	140K ▲470K	■18Ω	■35Ω	NC	†3500Ω	†250K ▲445Ω		
V4	35W4	NC	TP	■0Ω	■25Ω	445Ω	NC	¶ INF		

ALL MEASUREMENTS MADE IN "PLAY" POSITION UNLESS OTHERWISE DESIGNATED.
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V4.
▲ MEASURED IN "RECORD" POSITION.
■ MEASURED FROM PIN 3 OF V4.
NC NO CONNECTION
TP TIE POINT

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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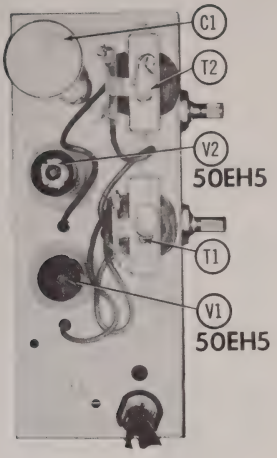
CONCORD MODEL 103

CONCORD MODEL 103

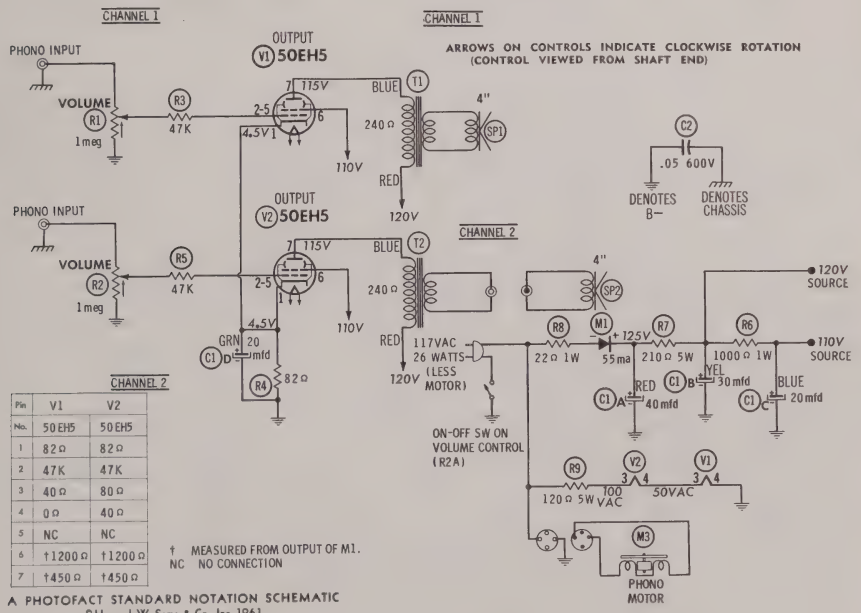
PHOTOFACT® Folder

CORONADO MODEL PH13-4033A

CORONADO MODEL
PH13-4033A



TRADE NAME	Coronado Model PH13-4033A
SUPPLIER	Gamble-Skogmo, Inc., 15 N. Eighth Street, Minneapolis 3, Minn.
TYPE SET	AC Operated 2 Tube Stereo Phono Amplifier With 4 Speed Manual Record Player
POWER SUPPLY	110 – 120 Volts AC, 60 Cycles RATING 26 Watts, .27 Amp. @ 117 Volts AC (Less Motor)



CHANNEL 2

Pin No.	V1 50EH5	V2 50EH5
1	82Ω	82Ω
2	47K	47K
3	40Ω	80Ω
4	0Ω	40Ω
5	NC	NC
6	†1200Ω	†1200Ω
7	†450Ω	†450Ω

† MEASURED FROM OUTPUT OF M1.
NC NO CONNECTION

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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SET 539 FOLDER 9

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE (• GENERAL ELECTRIC • RAYTHEON • SYLVANIA •)
V1	Channel 1 Output	50EH5
V2	Channel 2 Output	50EH5

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA CORONADO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	40	150	EC-121	PR4-200	BBRQ44315C	WQ230	CDBQ-1001	TVAS-4545 *	
B	30	150							
C	20	150							
D	20	25							

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	.05 600V		P688N-05	DD-503	CUB6S5	6DP-3-503	GEM-615	6TM-S50

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CORONADO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1meg	½	VC-118	B-70	A47-1meg-Z	Q13-137	U53	Volume, Channel 1
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R2A	1meg	½	VC-70	B-70-S	A47-1meg-Z	Q13-137	U53	Volume, Channel 2
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			Not Req.	SWE-12	76-1	US-26	Power Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R3	47K			
R4	82Ω			
R5	47K			
R6	1000Ω 1W			
R7	210Ω 5W	PW5-210	5W-SQ-210	
R8	22Ω 1W			
R9	120Ω 5W	PW5-120	5W-SQ-120	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA CORONADO PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2400Ω	3-4Ω	AT-51	A-3025	A-3332	24S53	S-12X	
T2	2400Ω	3-4Ω	AT-51	A-3025	A-3332	24S53	S-12X	

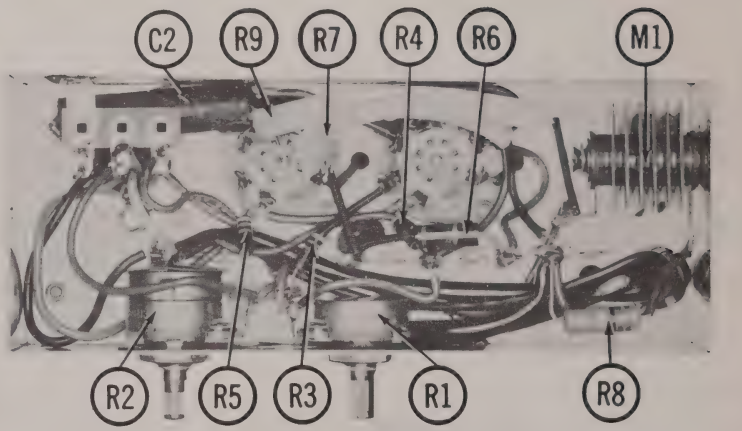
SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA CORONADO PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	SPK-38	4A1	
SP2	4"	PM	3-4Ω	SPK-38	4A1	

POWER RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA CORONADO PART No.	RCA PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.055A	SR-4 *	1N1763 ♦	100 *	SR200 ♦	* Selenium ♦ Silicon

CHASSIS—BOTTOM VIEW



PHONO CARTRIDGE & NEEDLES

*NEEDLE LISTINGS SHOWN ARE FOR RESPECTIVE REPLACEMENT CARTRIDGES ONLY.

ITEM No.	CORONADO PART No. CARTRIDGE	CORONADO PART No. NEEDLE*	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE*	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE*	SONOTONE PART No. CARTRIDGE	SONOTONE PART No. NEEDLE*	NOTES
M2	PU-46	NE-14 * (LP)	70TS KRK-74TS ①	N8-7 *	96T	Not Req.	12TH-S	Not Req.	① Includes tone arm cartridge & needles
		NE-15 * (78 RPM)		N8-3*					

MISCELLANEOUS

ITEM No.	PART NAME	CORONADO PART No.	NOTES
M3	Motor Idler Wheel	4-M-18	4 Speed, Complete WALSCO Part No. 1433

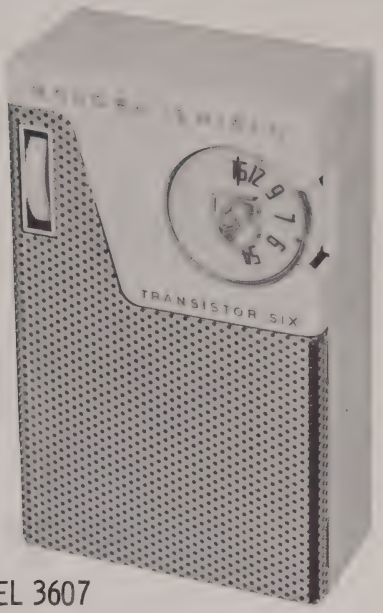
WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors; 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length); 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT® Folder with CIRCUITRACE®

**GOLDEN SHIELD MODELS
3500, 3608, 3609 (Ch. BP300)**

GOLDEN SHIELD MODELS
3500, 3608, 3609 (Ch. BP300)



MODEL 3607

GOLDEN SHIELD MODELS
3500, 3608, 3609 (Ch. BP300)

TRADE NAME	Golden Shield Models 3500, 3608, 3609 (Ch. BP300)		
SUPPLIER	Golden Shield Corp., Service Dept., 700 Ellicott Street, Batavia, N. Y.		
TYPE SET	Battery Operated Transistorized Portable AM Receiver		
POWER SUPPLY	9 Volts DC	RATING	5MA @ 9 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	540 — 1600KC		10MA @ 9 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1, A2, A3.....GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538
A4, A7, A7..... GENERAL CEMENT #5000, 5003, 5066, 8276, 8290, 9087, 9089
WALSCO #2512, 2525, 2528

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Loop	455KC (400% Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.	"	1600KC	1600KC	"	A4	"
3.	"	600KC	600KC	"	A5, A6	"
4.	"	1400KC	1400KC Signal.	"	A7	Adjust for maximum output. Repeat Steps 2, 3 and 4.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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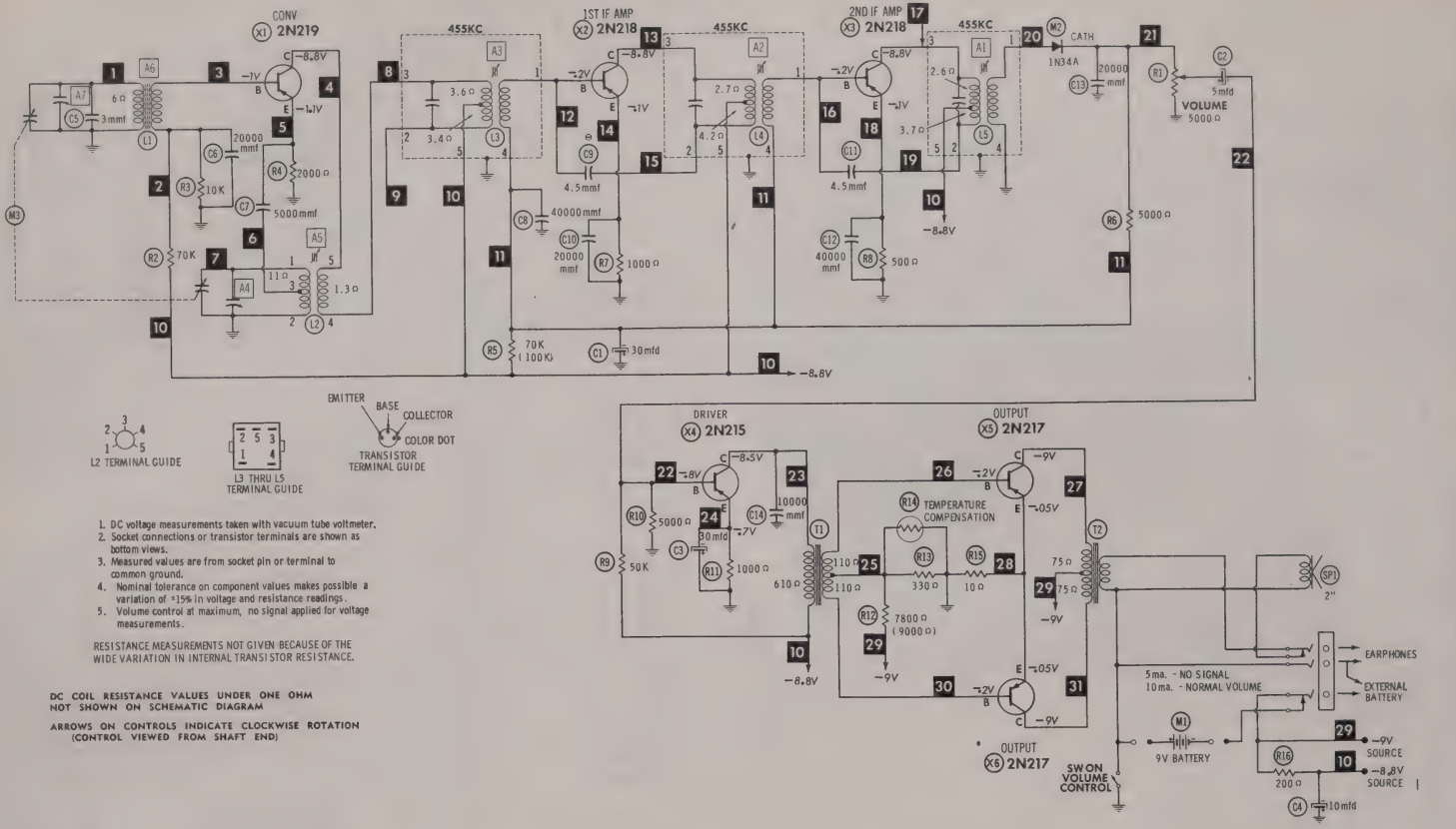
SET 539 FOLDER 10



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC
with CIRCUITRACE®

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GOLDEN SHIELD MODELS
3500, 3608, 3609 (Ch. BP300)

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N219	Converter	2N219	2N486	2N219	PNP
X2	2N218	1st IF Amplifier	2N218	2N483	2N218	PNP
X3	2N218	2nd IF Amplifier	2N218	2N483	2N218	PNP
X4	2N215	Driver	2N407	2N362	2N104	PNP
X5	2N217	Output	2N407	2N631	2N217	PNP
X6	2N217	Output	2N407	2N631	2N217	PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Golden Shield PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	30	3	995-0029			TT3X25			
C2	5	3	995-0031		NLW5-15	TT6X5			
C3	30	3	995-0029			TT3X25			
C4	10	10	995-0030		NLW10-15	TT12X10			

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	3		NPO-SI 3.0	TCZ-3R3	C10V3C	CCTO-3R3	CNO-533	10TCC-V33
C6	20000		C80V202AM	DA-203	H-05S2		TA-120	TG-S20
C7	5000		C80V502AM	DA-502	H-05D5	CCD-502	TA-250	TG-D50
C8	40000	#995-0026						
C9	4.5	Note 1	NPO-SI 5.0	TCZ-4R7	C10V5C	CCTO-4R7	CNO-547	10TCC-V50
C10	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C11	4.5		NPO-SI 5.0	TCZ-4R7	C10V5C	CCTO-4R7	CNO-547	10TCC-V50
C12	40000	#995-0028						
C13	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C14	10000		C80V103AM	DM-103	H-05S1		TA-110	TG-S10

Golden Shield Part Number.
Note 1. Some versions may use 6mmf in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Golden Shield PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	5000Ω	1/4	995-0014					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R2	70K				R10	5000Ω			
R3	10K				R11	1000Ω			
R4	2000Ω				R12	7800Ω			(9000Ω) *
R5	70K			(100K) *	R13	330Ω			
R6	5000Ω				R14	Temp. Comp.			Pt. #995-0048
R7	1000Ω				R15	10Ω			
R8	500Ω				R16	200Ω			
R9	50K								

* Alternate Value.

PRINTED BOARD

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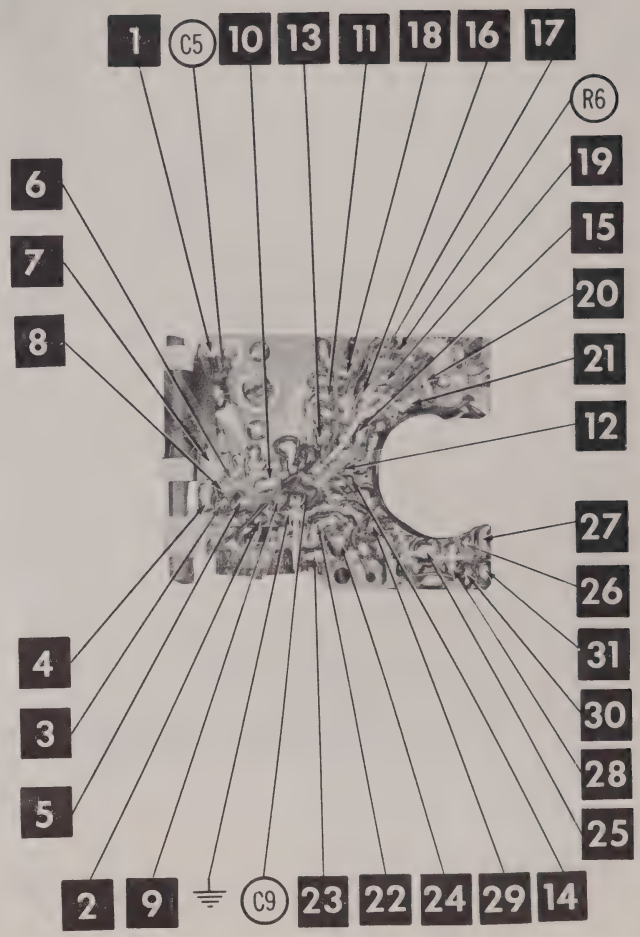


GOLDEN SHIELD MODELS
3500, 3608, 3609 (Ch. BP300)

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		Golden Shield PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L1	Loopstick	995-0002					
L2	Osc.	995-0003					
L3	1st IF	995-0004					
L4	2nd IF	995-0004					
L5	3rd IF	995-0004					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	Golden Shield PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1.7	1	995-0005					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	Golden Shield PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	1500Ω CT	10-12Ω	995-0006					

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Golden Shield PART No.	QUAM PART No.	
SP1	2"	PM	10-12Ω	995-0007		

BATTERIES

ITEM No.	VOLTAGE	Golden Shield PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	9V			2U6		216		M-1604	

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Golden Shield PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N34A			1N34A	1N34A	Detector (Pigtail)

MISCELLANEOUS

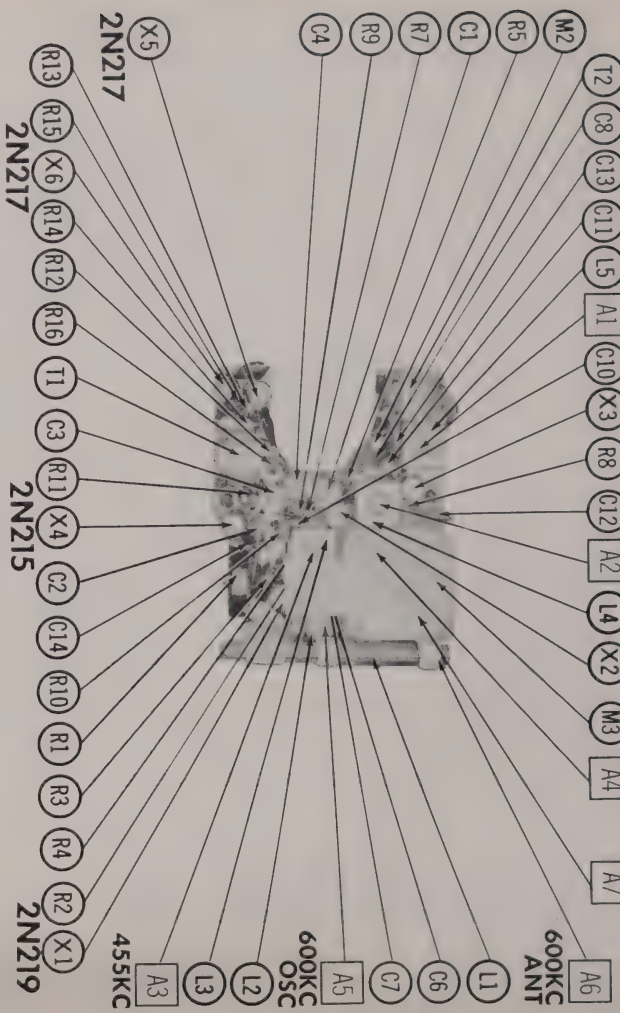
ITEM No.	PART NAME	Golden Shield PART No.	NOTES
M3	Tuning Cap.	995-0001	2 Gang.

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	995-0045	Tuning
Knob	995-0044	Volume
Cabinet Front	995-0046	Black
Cabinet Front	995-0047	Gray
Cabinet Front	995-0048	White
Cabinet Back	995-0049	Black
Cabinet Back	995-0050	Gray
Cabinet Back	995-0051	White

CHASSIS—TOP VIEW



PHOTOFACT® Folder with CIRCUITRACE®

SILVERTONE MODELS
1208, 1209 (Ch. 132.60601)

SILVERTONE MODELS
1208, 1209 (Ch. 132.60601)

MODEL 1208

SILVERTONE MODELS
1208, 1209 (Ch. 132.60601)

TRADE NAME	Silvertone Models 1208, 1209 (Ch. 132.60601)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan Avenue, Chicago, Illinois
TYPE SET	Battery Operated Transistorized Portable AM Receiver
POWER SUPPLY	6 Volts DC
RATING	7MA@6 Volts DC (No Signal, Min. Volume) 15MA@6 Volts DC (Signal, Normal Volume)
TUNING RANGE—BROADCAST	540 — 1650KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
A1, A2, A3.... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8729, 8987, 8988, 8989
WALSCO #2531, 2532, 2515
A4, A6.....GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A5.....GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .05mfd to antenna stator lug of tuning gang. Low side to chassis.	455KC (400∿ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Adjust for maximum output.
2.	Loop	1670KC	"	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	600KC	600KC	"	A5	"
4.	"	1400KC	1400KC Signal.	"	A6	Adjust for maximum output. Repeat Steps 2, 3 and 4.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of KF457

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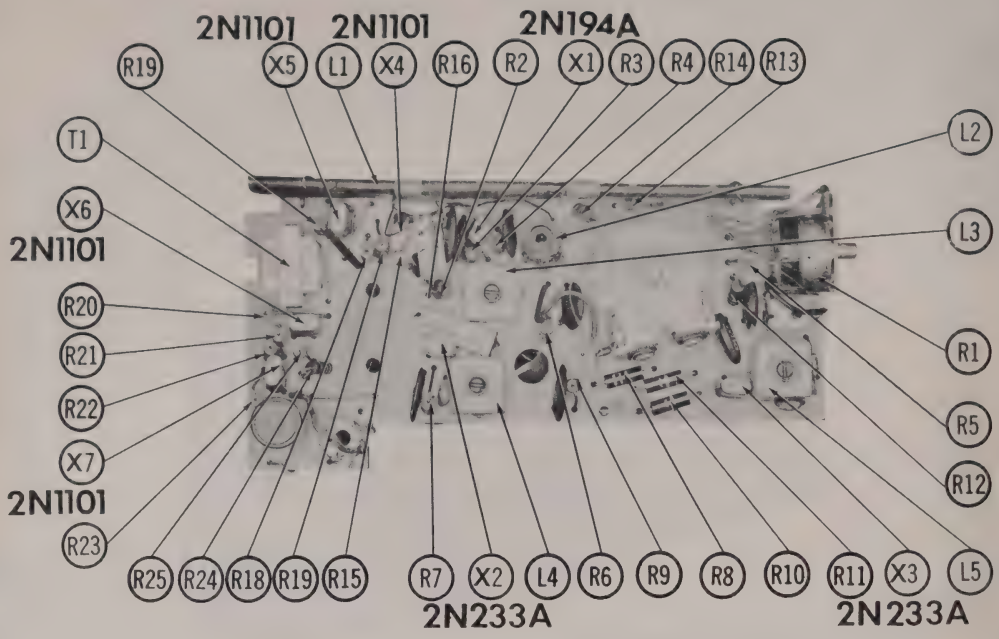
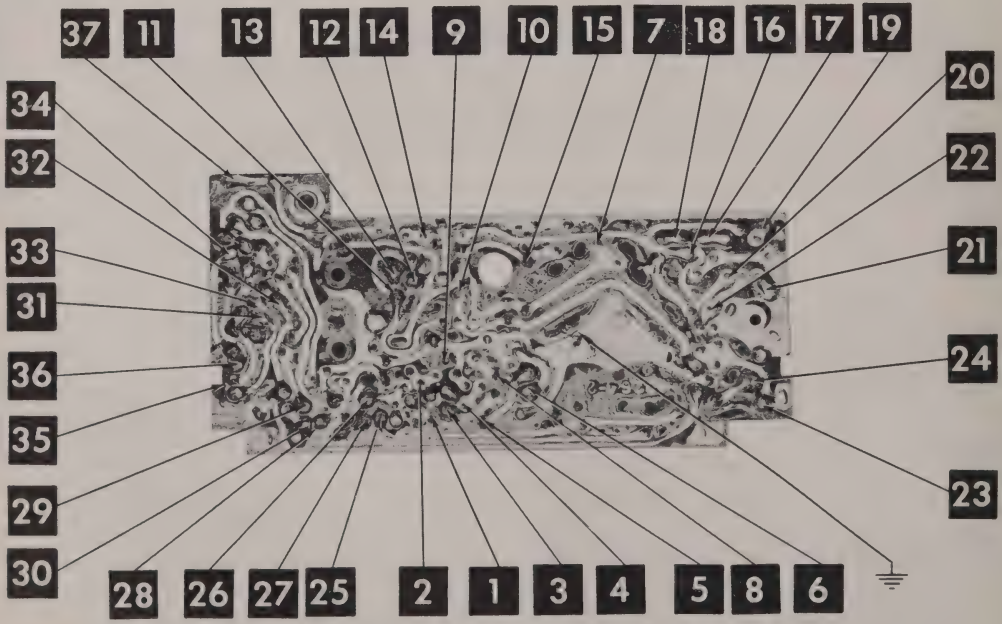
SET 539 FOLDER 11



CHASSIS TOP VIEW-RESISTOR, INDUCTOR & TRANSISTOR IDENT.



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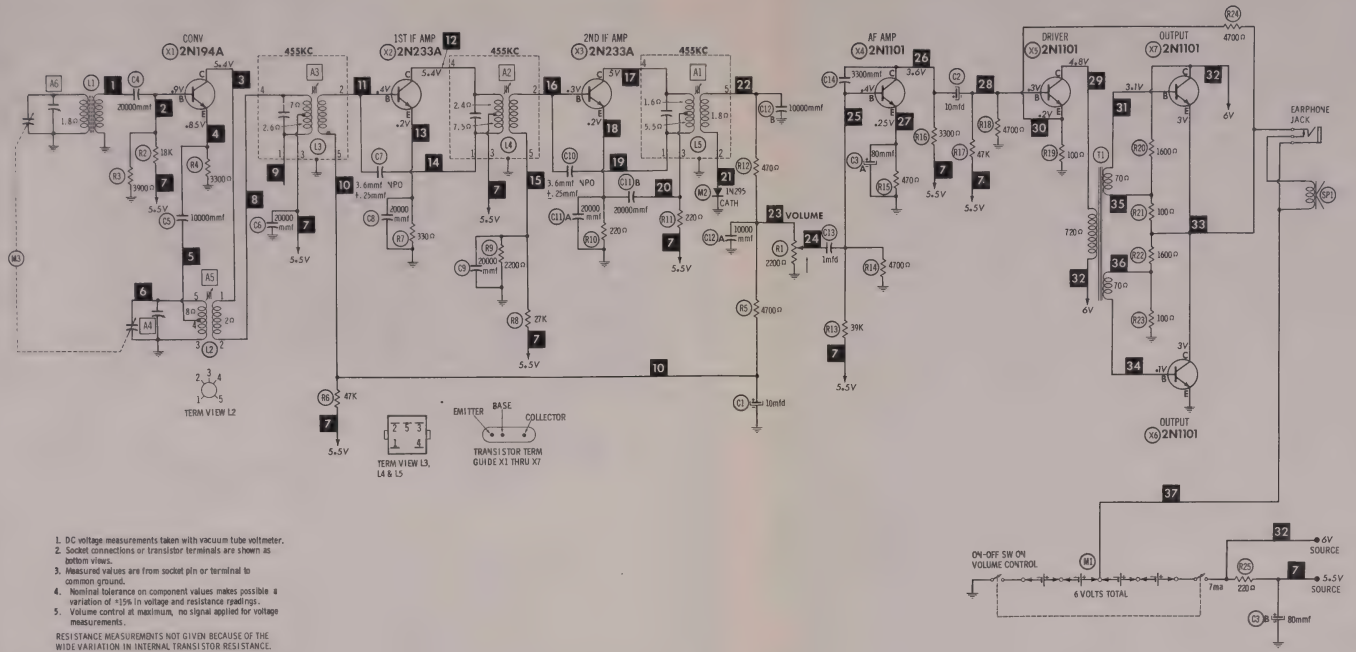
PRINTED BOARD



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

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with CIRCUITRACE
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SILVERTONE MODELS 1208, 1209 (Ch. 132.60601)

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N194A	Converter		2N1366	2N194	NPN
X2	2N233A	1st IF Amplifier		2N1367	2N233A	NPN
X3	2N233A	2nd IF Amplifier		2N1367	2N233A	NPN
X4	2N1101	AF Amplifier	2N649		2N1101	NPN
X5	2N1101	Driver	2N649		2N1101	NPN
X6	2N1101	Output	2N649		2N1101	NPN
X7	2N1101	Output	2N649		2N1101	NPN

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	10	10	44396-4	PTT-10010	NLW10-15	TT12X10	MLV10-10	TE-1114	
C2	10	10	44396-4	PTT-10010	NLW10-15	TT12X10	MLV10-10	TE-1114	
C3A	80	12	44397-3		ECPAN7	PETA2385	MLV100-12	VL-2350	
B	80	12					MLV100-12		

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	20000		BPD-02	DDM-203	H-05S2	CCD-203	TA-120	TG-S20
C5	10000		BPD-01	DDM-103	H-05S1	CCD-103	TA-110	TG-S10
C6	20000		BPD-02	DDM-203	H-05S2	CCD-203	TA-120	TG-S20
C7	3.6 NPO ± .25mmf		NPO-DI 3.3	DTZ-3R3	C10V33C	CCTO-3R3	CNO-533	10TCC-V33
C8	20000		BPD-02	DDM-203	H-05S2	CCD-203	TA-120	TG-S20
C9	20000		BPD-02	DDM-203	H-05S2	CCD-203	TA-120	TG-S20
C10	3.6 NPO ± .25mmf		NPO-DI 3.3	DTZ-3R3	C10V33C	CCTO-3R3	CNO-533	10TCC-V33
C11A	20000		BPD-2X02	DDM-203	H-05S2	CCD-203	TA-120	TG-S20
B	20000			DDM-203	H-05S2	CCD-203	TA-120	TG-S20
C12A	10000		BPD-2X01	DDM2-103	BYD6DS1	CCD-103	TA-110	TG-S10
B	10000					CCD-103	TA-110	TG-S10
C13	1mfd 3V	#44684-9		UK-105				
C14	3300		BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33

Silvertone Part Number.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SILVERTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	2200Ω	1/4	46800-4					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R2	18K				R14	4700Ω			
R3	3900Ω				R15	470Ω			
R4	3300Ω				R16	3300Ω			
R5	4700Ω				R17	47K			
R6	47K				R18	4700Ω			
R7	330Ω				R19	100Ω			
R8	27K				R20	1600Ω			
R9	2200Ω				R21	100Ω			
R10	220Ω				R22	1600Ω			
R11	220Ω				R23	100Ω			
R12	470Ω				R24	4700Ω			
R13	39K				R25	220Ω			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		SILVERTONE PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No	
L1	Loopstick	44511-6		2005		T530	
L2	Osc.	45783-12					
L3	1st IF	47163-1					
L4	2nd IF	47163-2					
L5	3rd IF	47163-3					

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO PRI.	TURNS RATIO SEC.	REPLACEMENT DATA SILVERTONE PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	3.8	1 SEC. 2 1	45604-6					

SPEAKER

ITEM No.	TYPE SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA SILVERTONE PART No.	QUAM PART No.	NOTES
SP1	2 3/4"	PM	40-50Ω	44280-5	27A06Z45	

BATTERIES

ITEM No.	VOLTAGE	SILVERTONE PART No.	REPLACEMENT DATA BURGESS "A"	BURGESS "B"	EVEREADY "A"	EVEREADY "B"	MALLORY "A"	MALLORY "B"	NOTES
M1	1.5V	6447 * or 6448 *♦		930*		1015 *		M-15R *	* 4 Required ♦ Mercury Type

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA SILVERTONE PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
M2	1N295			1N295	1N295	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M3	Tuning Cap.	48842	2 Gang

CABINETS & CABINET PARTS

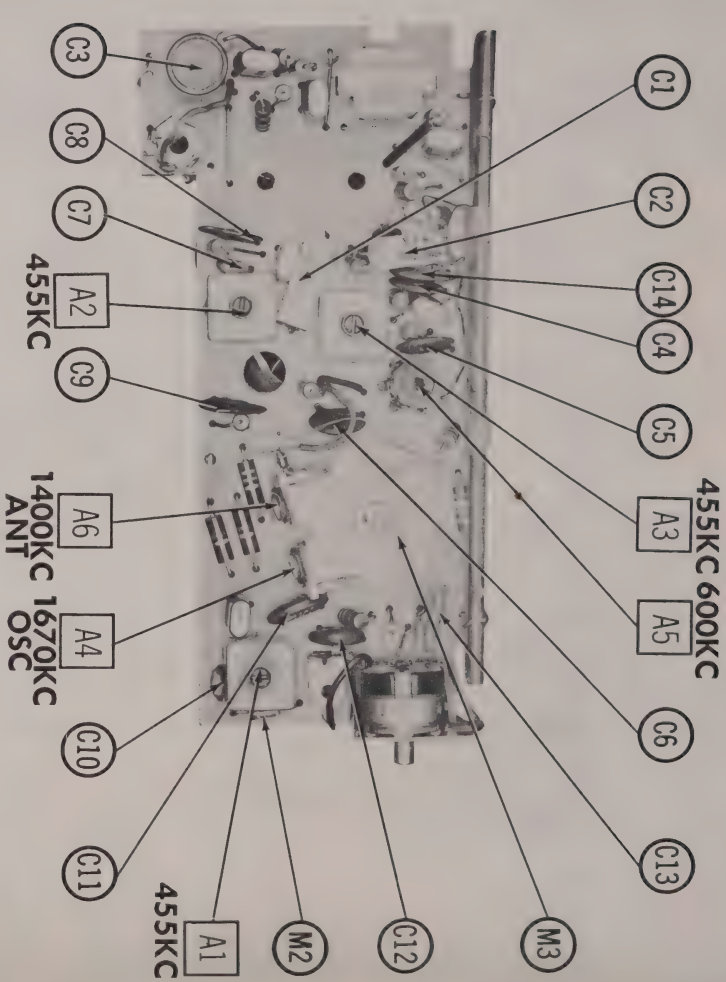
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	48825	Tuning, Clear
Knob	48828	Dial Insert
Knob	47437-29	Volume, Black, Model 1208
Knob	47437-95	Volume, Ice Blue, Model 1209
Cabinet Front	49401	
Cabinet Back	49205-29	Black, Model 1208
Cabinet Back	49205-95	Ice Blue, Model 1209
Handle	46923-1	

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



PHOTOFACT® Folder with CIRCUITRACE®

SONY MODEL TR-84

SONY MODEL TR-84

SONY MODEL TR-84

TRADE NAME	Sony Model TR-84
IMPORTER	Sony Corp. of America, 514 Broadway, New York 12, N. Y.
TYPE SET	Battery Operated Transistorized Portable AM Receiver
POWER SUPPLY	4.5 Volts DC
RATING	7MA @ 4.5 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	535 — 1605KC
	10MA @ 4.5 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1, A2, A3, A6 .....GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538

A5, A8, A9, A10.....GENERAL CEMENT #8607, 9291, 9294
WALSCO #2520, 2522, 2523, 2524, 2534, 2537

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Loop	455KC (400∿ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.	"	520KC	Tuning gang fully closed.	"	A4	Preset A10 at 2/3 maximum capacity. Adjust A4 for maximum output.
3.	"	1650KC	Tuning gang fully open.	"	A5	Adjust for maximum output.
4.	"	640KC	640KC Signal.	"	A6, A7	"
5.	"	1400KC	1400KC Signal.	"	A8, A9	Adjust for maximum output. Repeat Steps 2 thru 5.
6.	If the circuit tends to oscillate at the higher frequencies, turn A10 counterclockwise until oscillation stops. Repeat Step 3 and 5. If oscillations occur at approximately 910KC, M3 or C22 may need to be repositioned.					

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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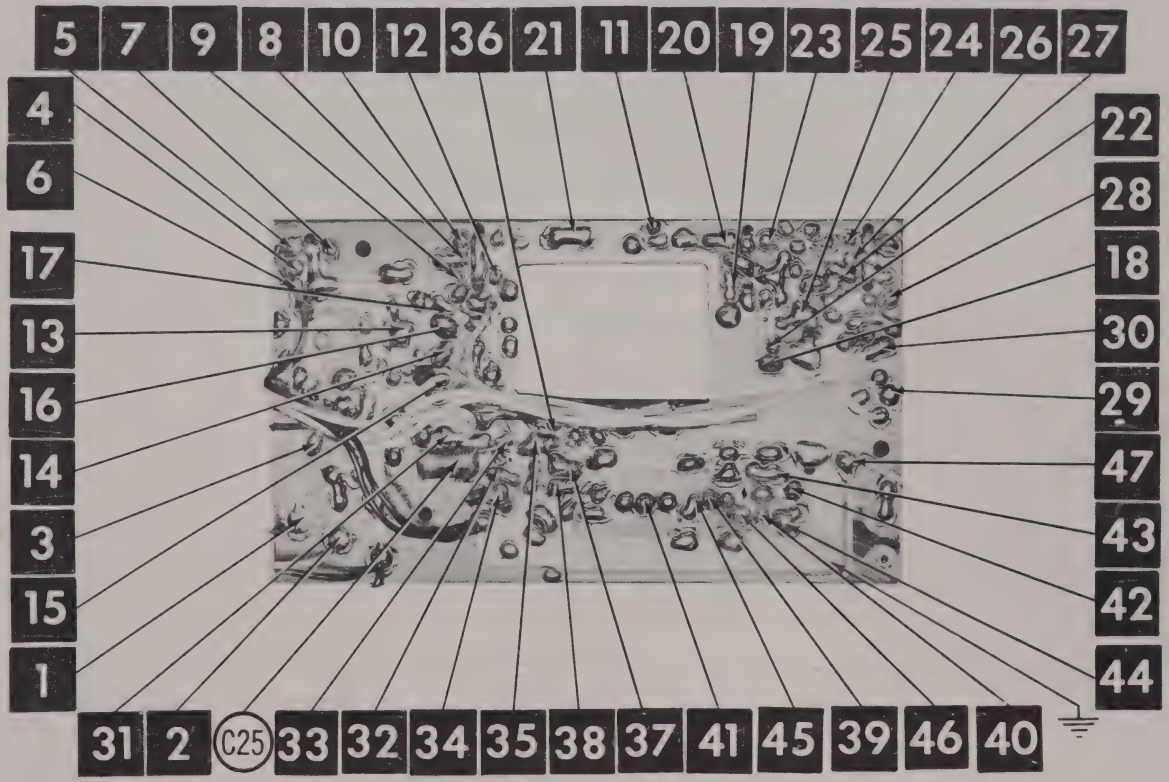
SET 539 FOLDER 12



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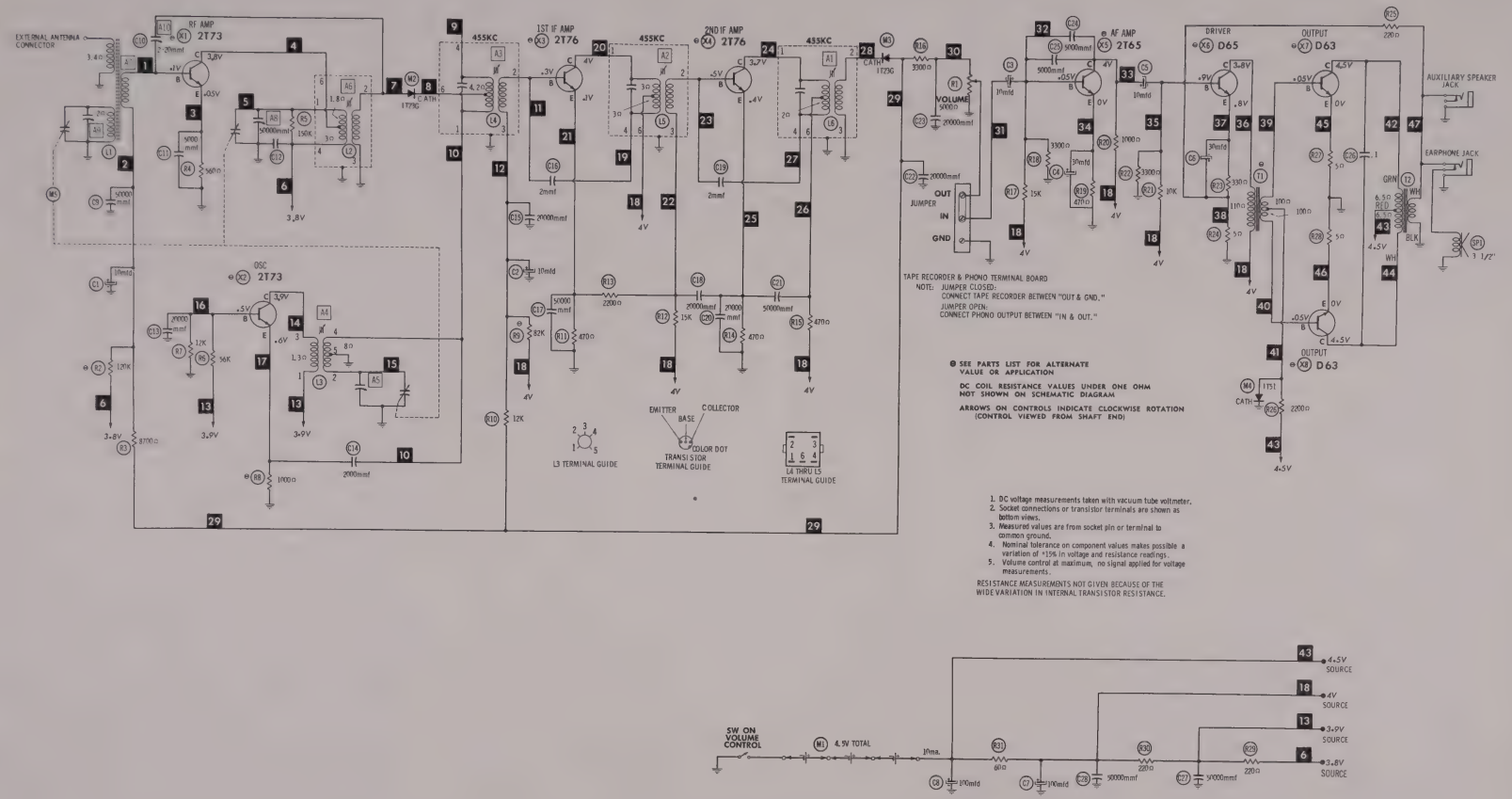
PRINTED BOARD


EXTERNAL ANTENNA CONNECTOR
RF AMP 2T73
OSC 2T73
1ST IF AMP 2T76
2ND IF AMP 2T76
AF AMP 2T65
DRIVER D65
OUTPUT D63
OUTPUT D63
455KC
455KC
455KC
VOLUME 5000Ω
OUT
JUMPER
IN
GND
AUXILIARY SPEAKER JACK
EARPHONE JACK
TAPE RECORDER & PHONO TERMINAL BOARD
NOTE: JUMPER CLOSED:
CONNECT TAPE RECORDER BETWEEN "OUT & GND."
JUMPER OPEN:
CONNECT PHONO OUTPUT BETWEEN "IN & OUT."
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
L3 TERMINAL GUIDE
TRANSISTOR TERMINAL GUIDE
L4 THRU L5 TERMINAL GUIDE
EMITTER
BASE
COLLECTOR
COLOR DOT
1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.
RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.
SW ON VOLUME CONTROL
4.5V TOTAL
10ma.
4.5V SOURCE
4V SOURCE
3.9V SOURCE
3.8V SOURCE

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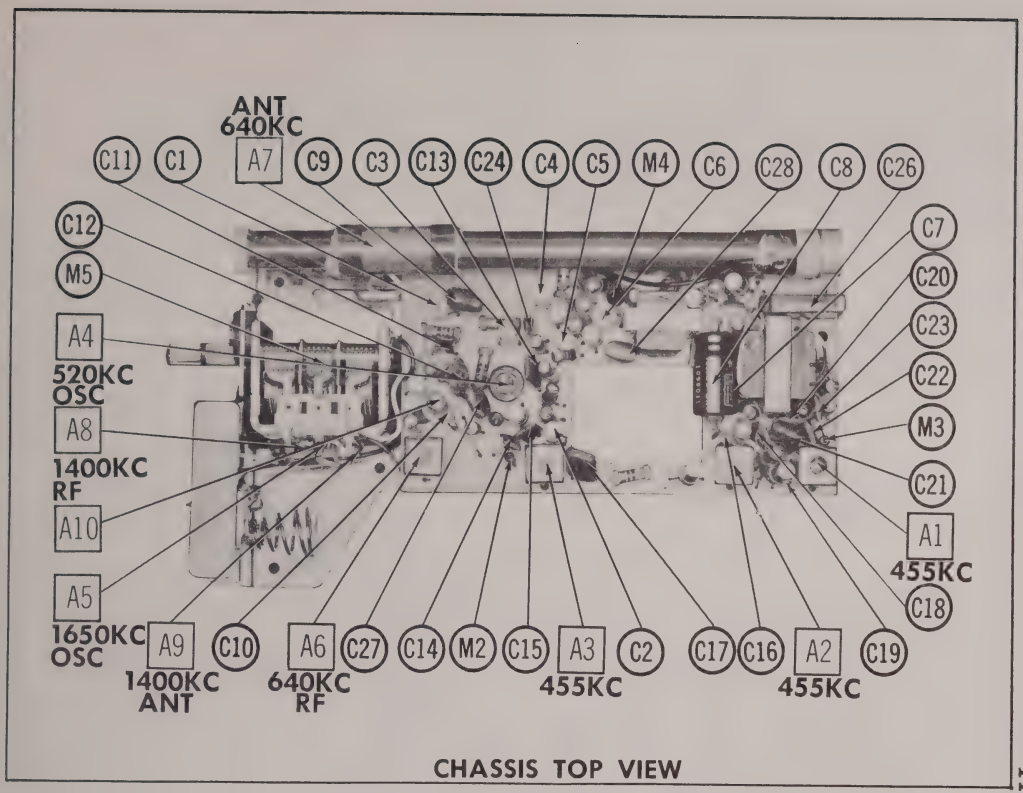
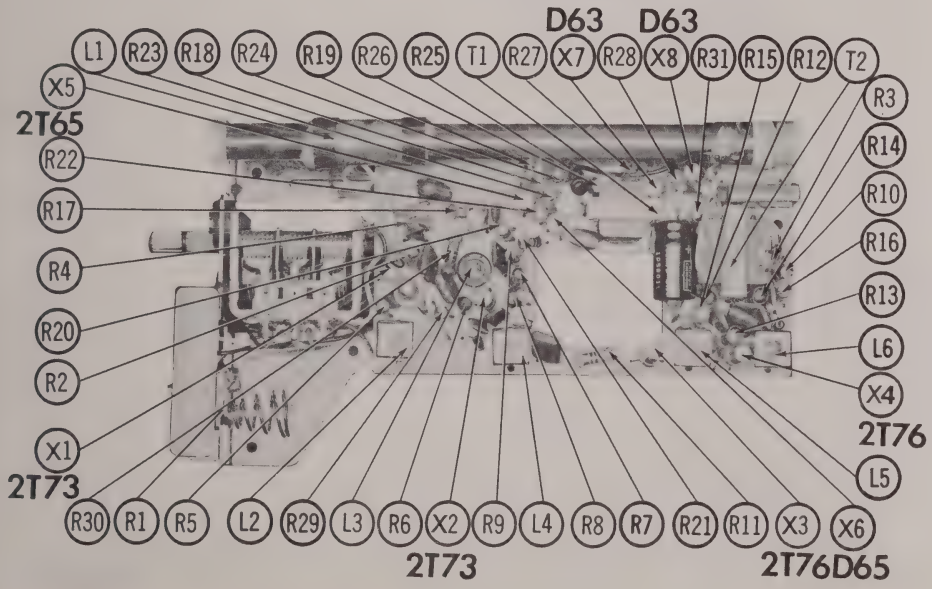
SONY MODEL TR-84



CHASSIS TOP VIEW



CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2T73	RF Amplifier			2N212	NPN
	2T734 *	RF Amplifier				
	2SC73 *	RF Amplifier				
	2T73Y *	RF Amplifier				
X2	2T73	Oscillator			2N212	NPN
	2T732 *	Oscillator				
	2SC73 *	Oscillator				
	2T73Y *	Oscillator				
X3	2T76	1st IF Amplifier				NPN
	2T750 *	1st IF Amplifier				
	2SC75 *	1st IF Amplifier				
	2SC76 *	1st IF Amplifier				
	2T768 *	1st IF Amplifier				
	2T757 *	1st IF Amplifier				
	2T75 *	1st IF Amplifier				
X4	2T76	2nd IF Amplifier				NPN
	2T750 *	2nd IF Amplifier				
	2SC75 *	2nd IF Amplifier				
	2SC76 *	2nd IF Amplifier				
	2T757 *	2nd IF Amplifier				
	2T768 *	2nd IF Amplifier				
	2T75 *	2nd IF Amplifier				
X5	2T65	AF Amp.	2N647		2N214	NPN
	2T652 *	AF Amp.				
	2SD65 *	AF Amp.				
	2T66 *	AF Amp.				
	2SD66 *	AF Amp.				
X6	D65	Driver	2N647			NPN
	2T650 *	Driver				
	2SD65 *	Driver				
	2SD66 *	Driver				
	2T66 *	Driver				
	2T65 *	Driver				
	2T652 *	Driver				
X7	D63	Output	2N647			NPN
	2T69 *	Output				
	2T31 *	Output				
	2SD69 *	Output				
	2SB31 *	Output				
	2T692 *	Output				
	2T693 *	Output				
	2SD63 *	Output				
X8	D63	Output	2N647			NPN
	2T69 *	Output				
	2T31 *	Output				
	2SD69 *	Output				
	2SB31 *	Output				
	2T692 *	Output				
	2T693 *	Output				
	2SD63 *	Output				

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	SONY PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	10	3		PTT-3010	NLW10-6	TT3X10	MLV10-3	TE-1053	
C2	10	3		PTT-3010	NLW10-6	TT3X10	MLV10-3	TE-1053	
C3	10	3		PTT-3010	NLW10-6	TT3X10	MLV10-3	TE-1053	
C4	30	3		PTT-3030	NLW30-6	TT6X30	MLV30-6	TE-1092	
C5	10	3		PTT-3010	NLW10-6	TT3X10	MLV10-3	TE-1053	
C6	30	3		PTT-3030	NLW30-6	TT6X30	MLV30-6	TE-1092	
C7	100	6		PTT-6100	NLW100-12	TT6X100	MLV100-6	TE-1102	
C8	100	6		PTT-6100	NLW100-12	TT6X100	MLV100-6	TE-1102	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C9	50000		C80V503AM	DA-503	H-05S5		TA-150	TG-S50
C10	2-20							
C11	5000		BPD-005	DD-502	H-05D5	CCD-502	TA-250	TG-D50
C12	50000		C80V503AM	DA-503	H-05S5		TA-150	TG-S50
C13	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C14	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C15	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C16	2		NPO-S1 2. 2	TCZ-2R2	C10V2C	CCTO-2R2	CNO-522	10TCC-V22
C17	50000		C80V503AM	DA-503	H-05S5		TA-150	TG-S50
C18	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C19	2		NPO-S1 2. 2	TCZ-2R2	C10V2C	CCTO-2R2	CNO-522	10TCC-V22
C20	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C21	50000		C80V503AM	DA-503	H-05S5		TA-150	TG-S50
C22	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C23	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C24	5000		BPD-005	DD-502	H-05D5	CCD-502	TA-250	TG-D50
C25	5000		BPD-005	DD-502	H-05D5	CCD-502	TA-250	TG-D50
C26	.1 100V				H-05P1	IDP-2-104	TA-010	TG-P10
C27	50000		C80V503AM	DA-503	H-05S5		TA-150	TG-S50
C28	50000		C80V503AM	DA-503	H-05S5		TA-150	TG-S50

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SONY PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	5000Ω	1/10						Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R2	120K			Note 1	R17	15K			
R3	8700Ω				R18	3300Ω			
R4	560Ω				R19	470Ω			
R5	150K				R20	1000Ω			
R6	56K				R21	10K			
R7	12K				R22	3300Ω			
R8	1000Ω				R23	330Ω			
R9	82K			Note 2	R24	5Ω			
R10	12K				R25	220Ω			
R11	470Ω				R26	2200Ω			
R12	15K				R27	5. 0Ω			
R13	2200Ω				R28	5. 0Ω			
R14	470Ω				R29	220Ω			
R15	470Ω				R30	220Ω			
R16	3300Ω				R31	60Ω			

Note 1. Value should be chosen for 180-280 microamp RF Amp collector current.
Note 2. Value should be chosen for 300-400 microamp 1st IF Amp collector current.

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		SONY PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L1	Loopstick	LA-040-1F					
L2	RF	LH-003					
L3	Osc.	LQ-025-Q					
L4	1st IF	LI-023AP					
L5	2nd IF	LI-008BP					
L6	3rd IF	LI-008CP					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	SONY PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	.9	1	TI-001 ①		TA-30			① Alternate Part #TI-007

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	SONY PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	150Ω CT	6-8Ω	TX-003		TA-39①			① Bend tabs down. Use 8Ω secondary.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	SONY PART No.	QUAM PART No.	
SP1	3½"	PM	6-8Ω	DS-008-1		

BATTERIES

ITEM No.	VOLTAGE	SONY PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V	*		130 *		635 *		M-14R *	* 3 Required

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		SONY PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1T23G			1N60	1N60	Mixer (Pigtail)
M3	1T23G			1N60	1N60	Detector (Pigtail)
M4	1T51					Bias Regulator (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	SONY PART No.	NOTES
M5	Tuning Cap.		3 Gang

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

PHOTOFACT® Folder

SYLVANIA MODEL 45P11 (Ch. 657-1)

SYLVANIA MODEL
45P11 (Ch. 657-1)

SYLVANIA MODEL
45P11 (Ch. 657-1)

TRADE NAME	Sylvania 45P11 (Ch. 657-1)
MANUFACTURER	Sylvania Home Electronics, Div. of Sylvania Electric Products, Inc., 700 Ellicott St., Batavia, N. Y.
TYPE SET	AC Operated 3 Tube Stereo Phono Amplifier With 4 Speed Automatic Record Changer
POWER SUPPLY	110 – 120 Volts AC, 60 Cycles RATING 31 Watts, .33 Amp. @117 Volts AC (Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER – SEE SIMILAR MONARCH UA12 – PHOTOFACT SET 465 FOLDER 6

SET 539 FOLDER 13

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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KT445

DATE 7–61 SET 539 FOLDER 13

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

TUBES

◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V1	Channel A AF Amp. - Channel B AF Amp.	12AX7
V2	Channel A Output	50C5
V3	Channel B Output	50C5

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA SYLVANIA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	60	150		AFH3-12	BBRT84215	TCT3119	TDLT-7	TVA-3455	①
B	40	150							①
C	20	150							

① Some versions may parallel C1C with a 20mfd section (C1 Part #161-3041).

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C3	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C4	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C5	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C6	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C7	.47 200V		P288N-47		CUB2P47	2DP-5-447	GEM-2047	2TM-P47
C8	.47 200V		P288N-47		CUB2P47	2DP-5-447	GEM-2047	2TM-P47
C9	.05 400V		P488N-05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA SYLVANIA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	3meg		153-0214	F1-79				Loudness, Channel A
B	3meg			R2-79 *				Loudness, Channel B
R2A	500K		153-0213	B-60	AD47-500K-Z		FA55A	Treble, Channel A
B	500K			SR-60	Not Req.		RU55A	Treble, Channel B
C	Shaft			Not Req.	KSS-3		CS3500	
R3A	3meg		153-0212	B-85			FC36A	Bass, Channel A
B	3meg			SR-85			RU36A	Bass, Channel B
C	Shaft			Not Req.			CS3500	

* Use Friction Spring AK-32.

RESISTORS

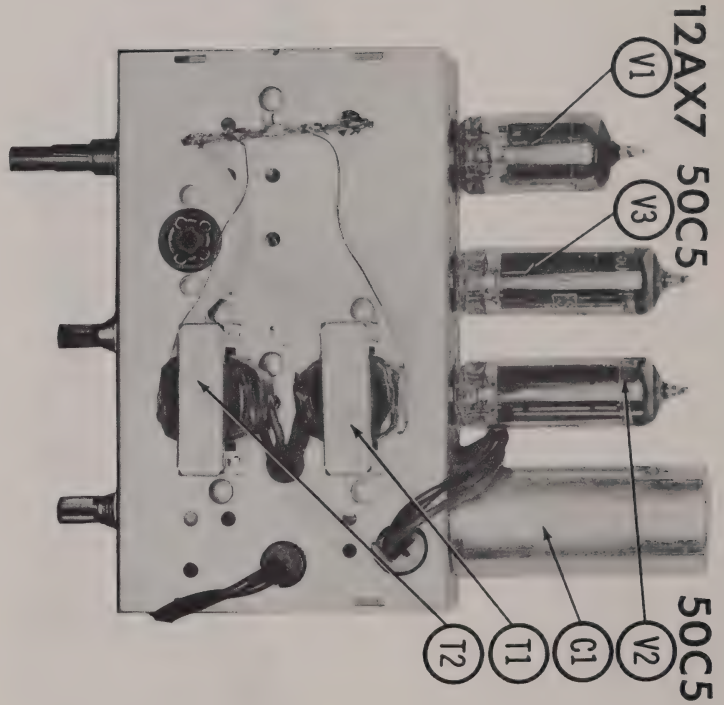
All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R4	100K			
R5	6.8meg			
R6	150Ω 1W			
R7	100Ω 1W			
R8	100K			
R9	6.8meg			

* Alternate Value.

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R10	150Ω 1W			
R11	100Ω 1W			
R12	2200Ω			(3300Ω) *
R13	100Ω 1W			
R14	47Ω 3W			
R15	47Ω 2W			

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	SYLVANIA PART No.	REPLACEMENT DATA
K1	Audio Coupling	250mmf, 1000mmf, 250K, 500K	190-0054	Aerovox PA-112-4 Centralab PC-81 Cornell Dubilier 113TM2 Sprague T-2
K2	Audio Coupling	250mmf, 1000mmf, 250K, 500K	190-0054	Aerovox PA-112-4 Centralab PC-81 Cornell Dubilier 113TM2 Sprague T-2

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	SYLVANIA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2600Ω	3-4Ω	143-0084	A-3025	A-3332	24S53	S-12X	
T2	2600Ω	3-4Ω	143-0084	A-3025	A-3332	24S53	S-12X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	SYLVANIA PART No.	QUAM PART No.	
SP1	6"	PM	3-4Ω	539-0612	6A15	
SP2	2"	PM	3-4Ω	539-2000	25A07	
SP3	6"	PM	3-4Ω	539-0612	6A15	
SP4	2"	PM	3-4Ω	539-2000	25A07	

POWER RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	SYLVANIA PART No.	RCA PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.100A	517-0024 *	1N1763 *	2F4 *	SR200 *	* Silicon Type

PHONO CARTRIDGE & NEEDLES

*NEEDLE LISTINGS SHOWN ARE FOR RESPECTIVE REPLACEMENT CARTRIDGES ONLY.

ITEM No.	REPLACEMENT DATA								NOTES
	SYLVANIA PART No.		ASTATIC PART No.		ELECTRO-VOICE PART No.		SONOTONE PART No.		
	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	
M2			86-TS-TB	N7-7 * & N8-3 *	96T	Not Req.	12TH-S	Not Req.	

MISCELLANEOUS

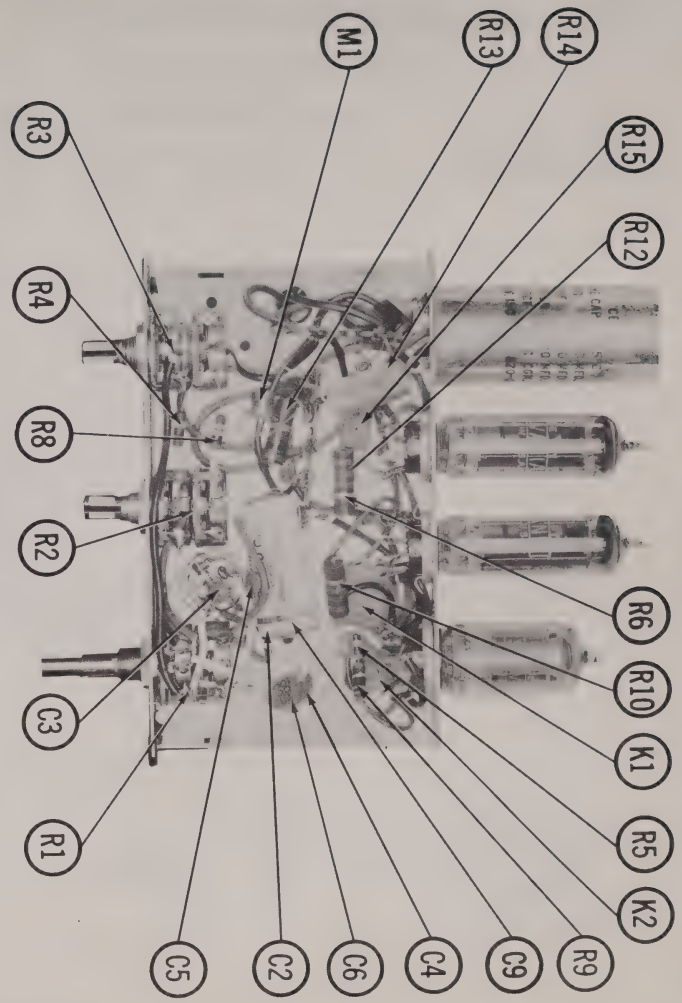
ITEM No.	PART NAME	SYLVANIA PART No.	NOTES
M3	Switch		Off-On, Part of Changer
M4	Motor		Phono-Drive, Part of Changer

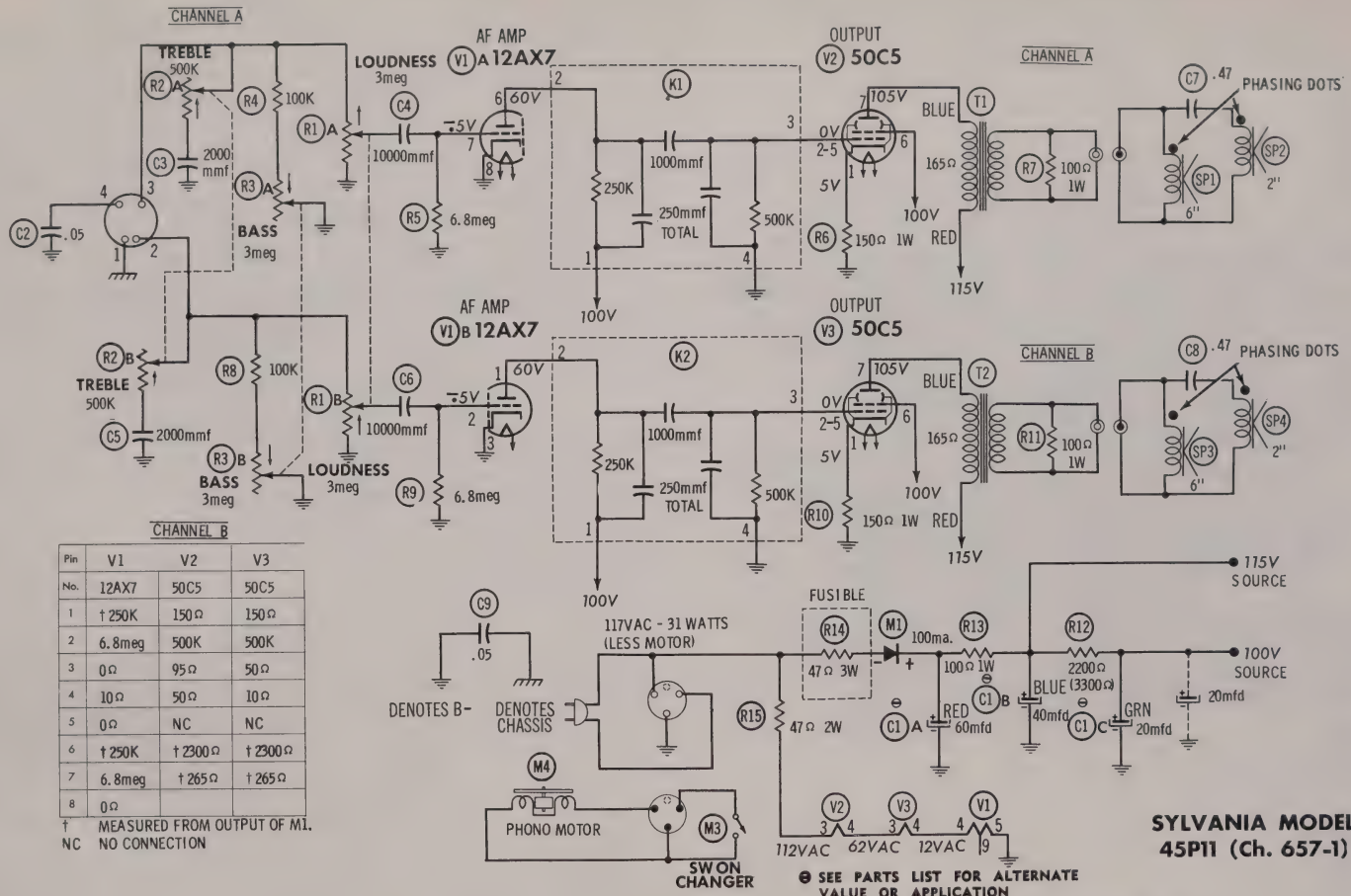
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	740-0316	Tone
Knob	740-0317	Loudness (Outer)
Knob	740-0318	Loudness (Inner)

CHASSIS—BOTTOM VIEW





CHANNEL B

Pin No.	V1 12AX7	V2 50C5	V3 50C5
1	†250K	150Ω	150Ω
2	6.8meg	500K	500K
3	0Ω	95Ω	50Ω
4	10Ω	50Ω	10Ω
5	0Ω	NC	NC
6	†250K	†2300Ω	†2300Ω
7	6.8meg	†265Ω	†265Ω
8	0Ω		

† MEASURED FROM OUTPUT OF M1.
NC NO CONNECTION

SYLVANIA MODEL 45P11 (Ch. 657-1)

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PHOTOFACT® Folder with CIRCUITRACE®

TRANSETTE
TRN-3, TRN-346B

TRANSETTE
TRN-3, TRN-346B

MODEL TRN-3

TRANSETTE
TRN-3, TRN-346B

TRADE NAME	Transette Models TRN-3, TRN-346B
IMPORTER	Co-Op Importing Co., Div. of Radiolab Inc., 1612 Grand Ave., Kansas City 8, Missouri.
TYPE SET	Battery Operated Transistorized Portable AM Receiver
POWER SUPPLY	9 Volts DC RATING 11MA @ 9 Volts DC
TUNING RANGE	BROADCAST 535-1650KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1, A2.....GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538
A3, A5.....GENERAL CEMENT #5000, 5003, 5066, 8276, 8290, 9087, 9089
WALSCO #2512, 2525, 2528

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	Loop	455KC (400~ mod.)	Tuning gang fully open	Across voice coil	A1, A2	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2	"	1600KC	1600KC	"	A3	"
3	"	600KC	600KC	"	A4	Adjust for maximum output while rocking tuning gang.
4	"	1400KC	Tune to 1400KC signal	"	A5	"

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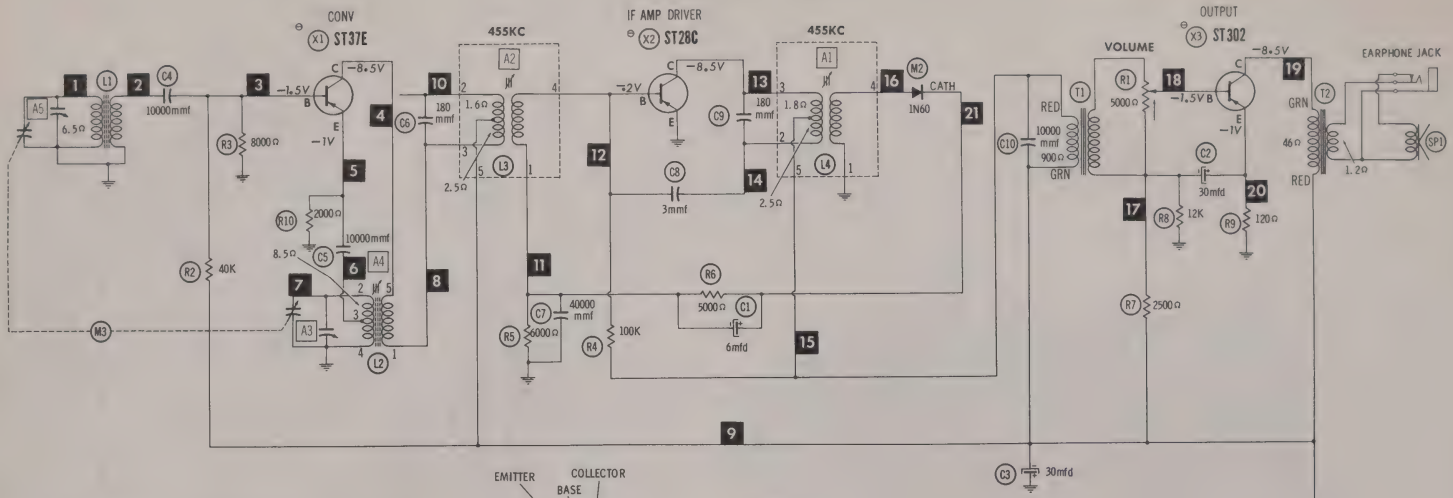
JF904R

SET 539 FOLDER 14



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common positive.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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TRANSETTE
TRN-3, TRN-346B

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	ST-37E *	Converter	2N411	2N486	2N412	PNP
X2	ST-28C †	IF Amp - Driver	2N409	2N483	2N410	PNP
X3	ST-302 ♦	Output	2N407	2N633	2N408	PNP

* Alternate types 2S30, 2N411, 2N412 may be used.
† Alternate types 2S31, 2N409, 2N410 may be used.
♦ Alternate types 2S33, 2N407, 2N408 may be used.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	TRANSETTE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	6	6			NLW231	TT6X5	ML6-6	TE-1085	
C2	30	10			NLW260	TT15X30		TE-1132	
C3	30	10			NLW260			TE-1132	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10
C5	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10
C6	180		DI-180	DD-181	L10T18	CCD-181	GP318	10TS-T18
C7	40000							
C8	3		NPO-DI3. 0	DTZ-3R3	C10V3C	CCTO-3R3	CNO-3R3	10TCC-V33
C9	180		DI-180	DD-181	L10T18	CCD-181	GP318	10TS-T18
C10	10000		C80V103AM	DDM-103	H-05S1		TA-110	TG-S10

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST-ANCE	WATTS	TRANSETTE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	5000Ω	1/10		B16-214				Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

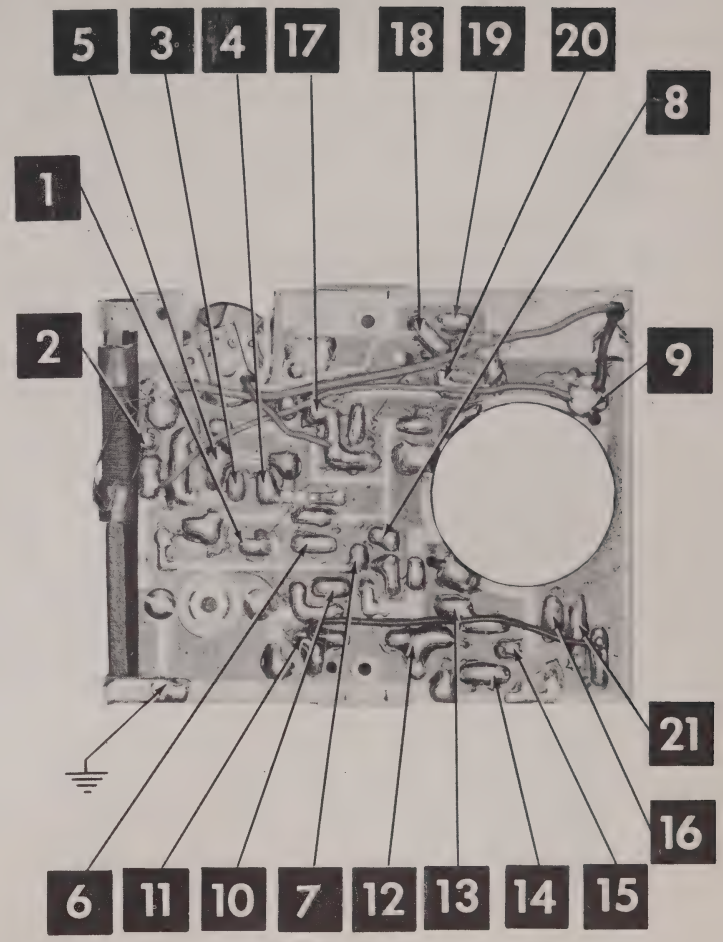
ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R2	40K				R7	2500Ω			
R3	8000Ω				R8	12K			
R4	100K				R9	120Ω			
R5	6000Ω				R10	2000Ω			
R6	5000Ω								

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		TRANSETTE PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L1	Loopstick						
L2	Oscillator						
L3	1st IF						
L4	2nd IF						

PRINTED BOARD

A Howard W. Sams CIRCUITRACE® Photo



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	TRANSETTE PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	3.5	1	R-12			TA-42		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	TRANSETTE PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	750Ω	6-8Ω	KR-34		TA-25①			① Tape & ignore primary CT, use 8Ω secondary.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	TRANSETTE PART No.	QUAM PART No.	
SP1	2-1/4"	PM	6-8Ω		22A06Z8	

BATTERIES

ITEM No.	VOLTAGE	TRANSETTE	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
		PART No.	"A"	"B"	"A"	"B"	"A"	"B"	
M1	9V			2U6		216		M-1604	

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		TRANSETTE PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N60			1N60	1N60	Detector (Pigtail)

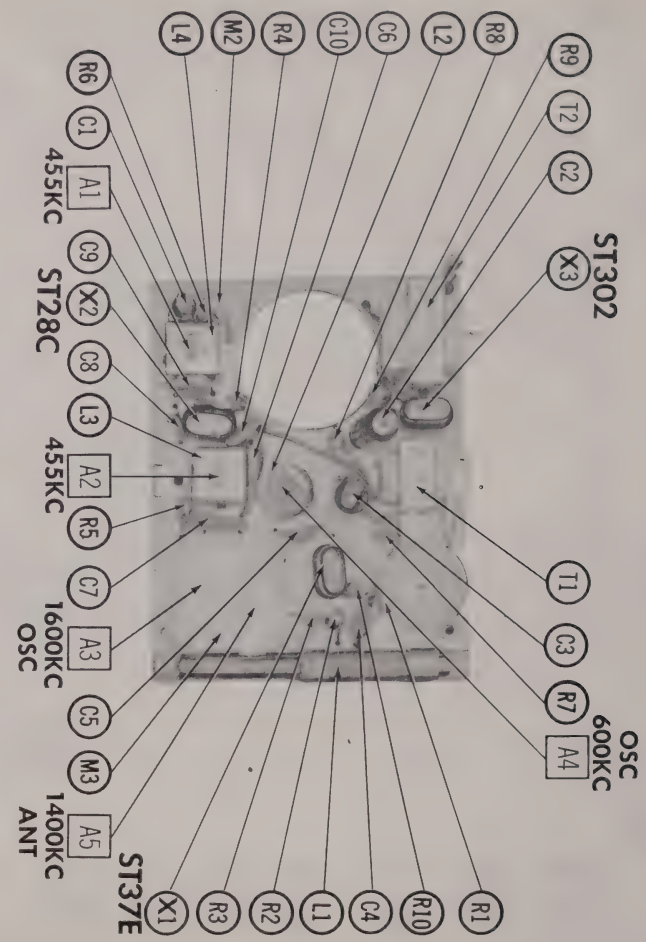
MISCELLANEOUS

ITEM No.	PART NAME	TRANSETTE PART No.	NOTES
M3	Tuning Cap		2 Gang

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



PHOTOFACT® Folder with CIRCUITRACE®

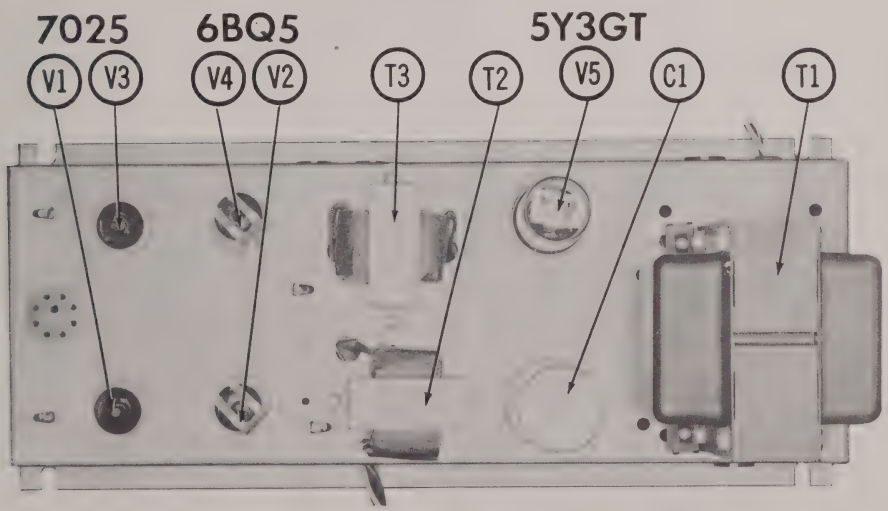
WEBCOR MODELS BC-1065-1, MC-1065-1, WC-1065-1 (Ch. 14X318-1)

WEBCOR MODELS BC-1065-1, MC-1065-1, WC-1065-1 (Ch. 14X318-1)

WEBCOR MODELS BC-1065-1, MC-1065-1, WC-1065-1 (Ch. 14X318-1)

TRADE NAME	Webcor Models BC-1065-1, MC-1065-1, WC-1065-1 (Ch. 14X318-1)
MANUFACTURER	Webcor Inc., 5610 W. Bloomingdale Ave., Chicago 39, Illinois
TYPE SET	AC Operated 5 Tube Stereo Phono Amplifier With 4 Speed Automatic Record Changer
POWER SUPPLY	110 - 120 Volts AC, 60 Cycles RATING 83 Watts, .77 Amp. @117 Volts AC (Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER PART #T184-13 — SEE WEBCOR 172 — PHOTOFACT SET 447 FOLDER 13 OR RECORD CHANGER MANUAL RC-12



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JT952

SET 539 FOLDER 15

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

TUBES

• GENERAL ELECTRIC • RAYTHEON • SYLVANIA •

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Channel 1 AF Amp.	7025/12AX7	V4	Channel 2 Output	6BQ5
V2	Channel 1 Output	6BQ5	V5	Rectifier	5Y3GT
V3	Channel 2 AF Amp.	7025/12AX7			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA WEBCOR PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲35	375	30P306	AFH4-79	D0150	FP421.4	TMQ-96	TVL-4771	
B	■35	375			BBR25-25			TVA-1205	
C	▲15	350							
D	25	25							
C2	60	400	30P378	PRS1770	BR6045	TC795	TD-80-450	TVA-1714	
C3A	130	25VAC	30P379					TVANS-2225*	
B	130	25VAC							

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

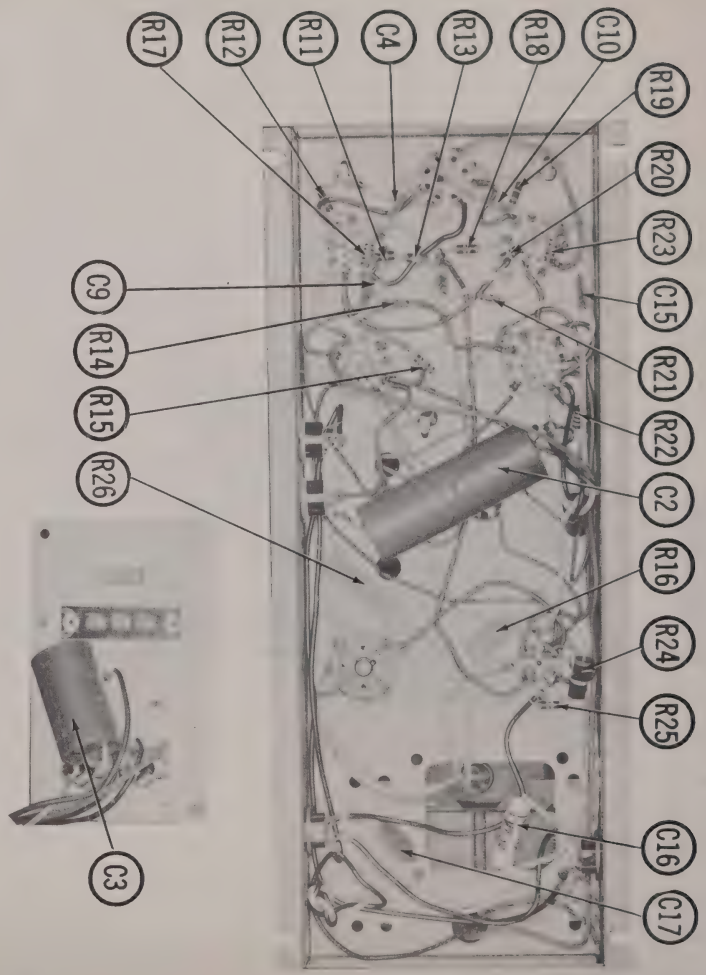
ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C5	330		BPD-00033	DD-331	L10T33	CCD-331	B-333	10TS-T33
C6	1500		BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15
C7	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C8	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C9	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C10	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	330		BPD-00033	DD-331	L10T33	CCD-331	B-333	10TS-T33
C12	1500		BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15
C13	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C14	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C15	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C16	.05 400V		P488N-05	DD-503	CUB485	4DP-3-503	GEM-415	4TM-S5
C17	10000 1400V		DAC-27	DD16-103	HVE16S1	16DP-3-103	2HV-110	BL-S10

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA WEBCOR PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2meg *		31P168	BT-174				Volume, Channel 1
B	2meg *			STR-174				Volume, Channel 2
R2A	1meg		31P158	B-69	A47-1meg-S	Q11-137	U54	Balance
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	1meg		31P157	B-70	AD47-1meg-Z		FA16A	Bass, Channel 2
B	1meg			SR-70	Not Req.		RU16A	Bass, Channel 1
C	Shaft			Not Req.	FS-3		CS3500	
R4A	1meg		31P157	B-70	AD47-1meg-Z		FA16A	Treble, Channel 2
B	1meg			SR-70	Not Req.		RU16A	Treble, Channel 1
C	Shaft			Not Req.	FS-3		CS3500	

* Taps @ 300K & 600K.

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS
R5	27K			
R6	120K			
R7	100K			
R8	27K			
R9	120K			
R10	100K			
R11	100K			
R12	2700Ω			
R13	100K			
R14	3300Ω			
R15	4700Ω			
R16	82K 5W	PW5-82K	5W-SQ-82K	
R17	33K			
R18	100K			
R19	2700Ω			
R20	100K			
R21	3300Ω			
R22	470K			
R23	33K			
R24	1000Ω 2W			
R25	10K			
R26	9000Ω 7W	PW7-9K	7W-SQ-9K	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	WEBCOR PART No.	REPLACEMENT DATA
K1	Volume Compensation	75mmf, 100mmf, 1100mmf, 2500mmf, 94K, 240K	62P017	Centralab PC-404
K2	Volume Compensation	75mmf, 100mmf, 1100mmf, 2500mmf, 94K, 240K	62P017	Centralab PC-404

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	PRI.	SEC. 1	SEC. 2	WEBCOR PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	117V ⓐ .77A	580 VCT ⓐ .120A	5V ⓐ 2A	68P081	P-3134①		P-8352①			
	SEC. 3	SEC. 4	SEC. 5							
	12.6VCT ⓐ 1.6A									

① Drill New Mounting Holes.

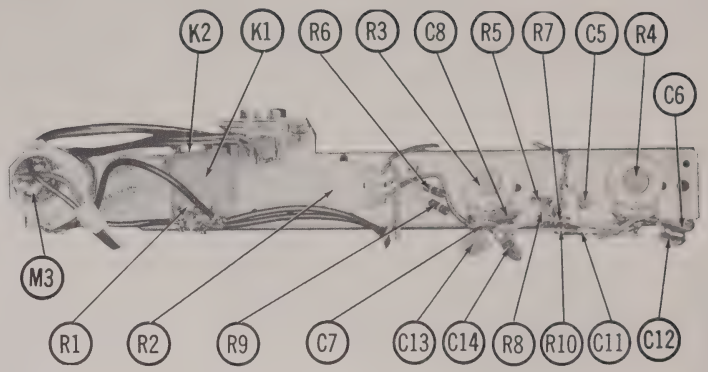
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		WEBCOR PART No.	REPLACEMENT DATA					NOTES
	PRI.	SEC.		Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7100Ω	16Ω	67P082						
		SEC. 2							
		70Ω							
	PRI.	SEC. 1							
T3	7100Ω	16Ω	67P082						
		SEC. 2							
		70Ω							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	WEBCOR PART No.	QUAM PART No.	
SP1	5"	PM	6-8Ω	76P097	5A1Z8	
SP2	10"	PM	10-12Ω	76P098	10A6AZ12.4	
SP3	5"	PM	6-8Ω	76P097	5A1Z8	

CONTROL PANEL—REAR VIEW



PHONO CARTRIDGE & NEEDLES

*NEEDLE LISTINGS SHOWN ARE FOR RESPECTIVE REPLACEMENT CARTRIDGES ONLY.

ITEM No.	REPLACEMENT DATA								NOTES
	WEBCOR PART No.		ASTATIC PART No.		ELECTRO-VOICE PART No.		SONOTONE PART No.		
	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	CARTRIDGE	NEEDLE*	
M1 M2	21P586	Not Req.	13T	Not Req.	13	Not Req.	10T2-S	Not Req.	

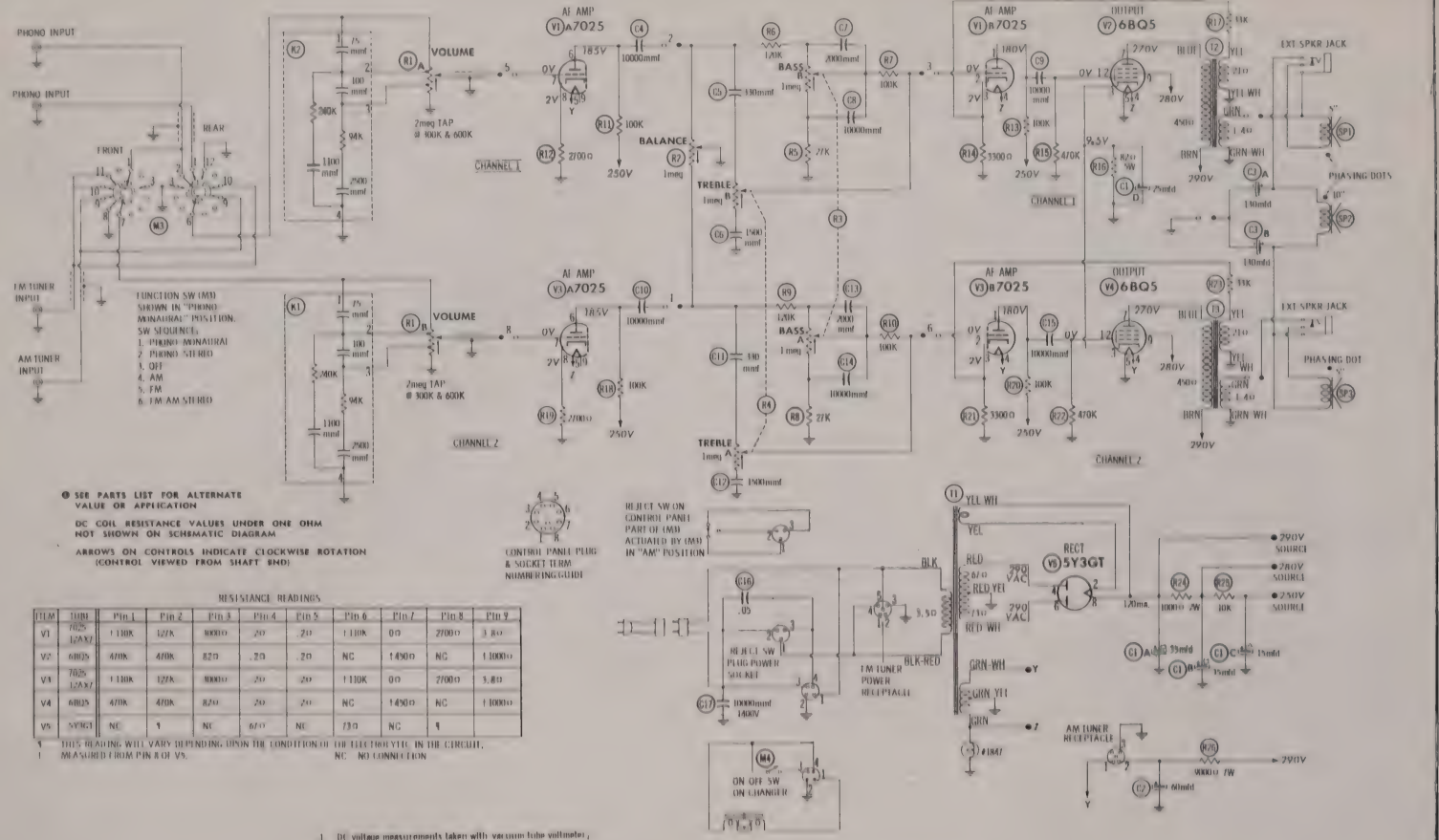
MISCELLANEOUS

ITEM No.	PART NAME	WEBCOR PART No.	NOTES
M3	Switch	11X2269	Function (Rotary Wafer Type)
M4	Switch		Changer Off-On (Part of Changer)
M5	Motor		Turntable Drive (Part of Changer)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	39P227-3	Volume, Bass, Treble
Knob	39P227-4	Balance
Knob	39P227-5	Selector
Cabinet	92X113-1	Mahogany, Model MC-1065-1
Cabinet	92X113-2	Blonde, Model BC-1065-1
Cabinet	92X113-3	Walnut, Model WC-1065-1



● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	7025 12AX7	1100K	127K	90000	20	20	1100K	00	2700Ω	3.8Ω
V2	6BQ5	470K	470K	82Ω	20	20	NC	1450Ω	NC	1.1000Ω
V3	7025 12AX7	1100K	127K	90000	20	20	1100K	00	2700Ω	3.8Ω
V4	6BQ5	470K	470K	82Ω	20	20	NC	1450Ω	NC	1.1000Ω
V5	5Y3GT	NC	¶	NC	67Ω	NC	73Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
1 MEASURED FROM PIN 8 OF V5. NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum; proper output load connected.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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WEBCOR MODELS BC-1065-1, MC-1065-1, WC-1065-1 (Ch. 14X318-1)

PHOTOFACT® Folder with CIRCUITRACE®

WESTINGHOUSE
CHASSIS V-2397-4

WESTINGHOUSE
CHASSIS V-2397-4

MODEL H-725P6A

WESTINGHOUSE
CHASSIS V-2397-4

TRADE NAME	Westinghouse Models H-725P6A, H-726P6A, H-727P6A, H-728P6A, H-771P6, H-771P6GP, H-772P6, H-772P6GP, H-773P6, H-773P6GP, (Ch. V-2397-4)
MANUFACTURER	Westinghouse Electric Corp., Radio & Television Div., Metuchen, N. J.
TYPE SET	Battery Operated Transistorized Portable AM Receiver
POWER SUPPLY	6 Volts DC RATING 9MA@ 6 Volts DC (No Signal, Min Volume) 15MA@ 6 Volts DC (Signal, Normal Volume)
TUNING RANGE	BROADCAST 540-1600KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1, A2, A3... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8729, 8987, 8988, 8989
WALSCO #2515, 2531, 2532
A4, A6..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A5..... GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Loop	455KC (400∿ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.	"	1625KC	"	"	A4	"
3.	"	600KC	600KC	"	A5	"
4.	"	1400KC	1400KC Signal.	"	A6	Adjust for maximum output. Repeat Steps 2, 3, and 4.

DISASSEMBLY INSTRUCTIONS

1. Remove tuning and volume control knobs. (Loop string under tuning knob and pull up).
2. Remove phillips head screw under tuning knob. (Screw length critical)
3. Loosen 2 screws on back cover. Remove back.
4. Remove 2 hex head chassis mounting screws.
5. Remove chassis.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

EIA

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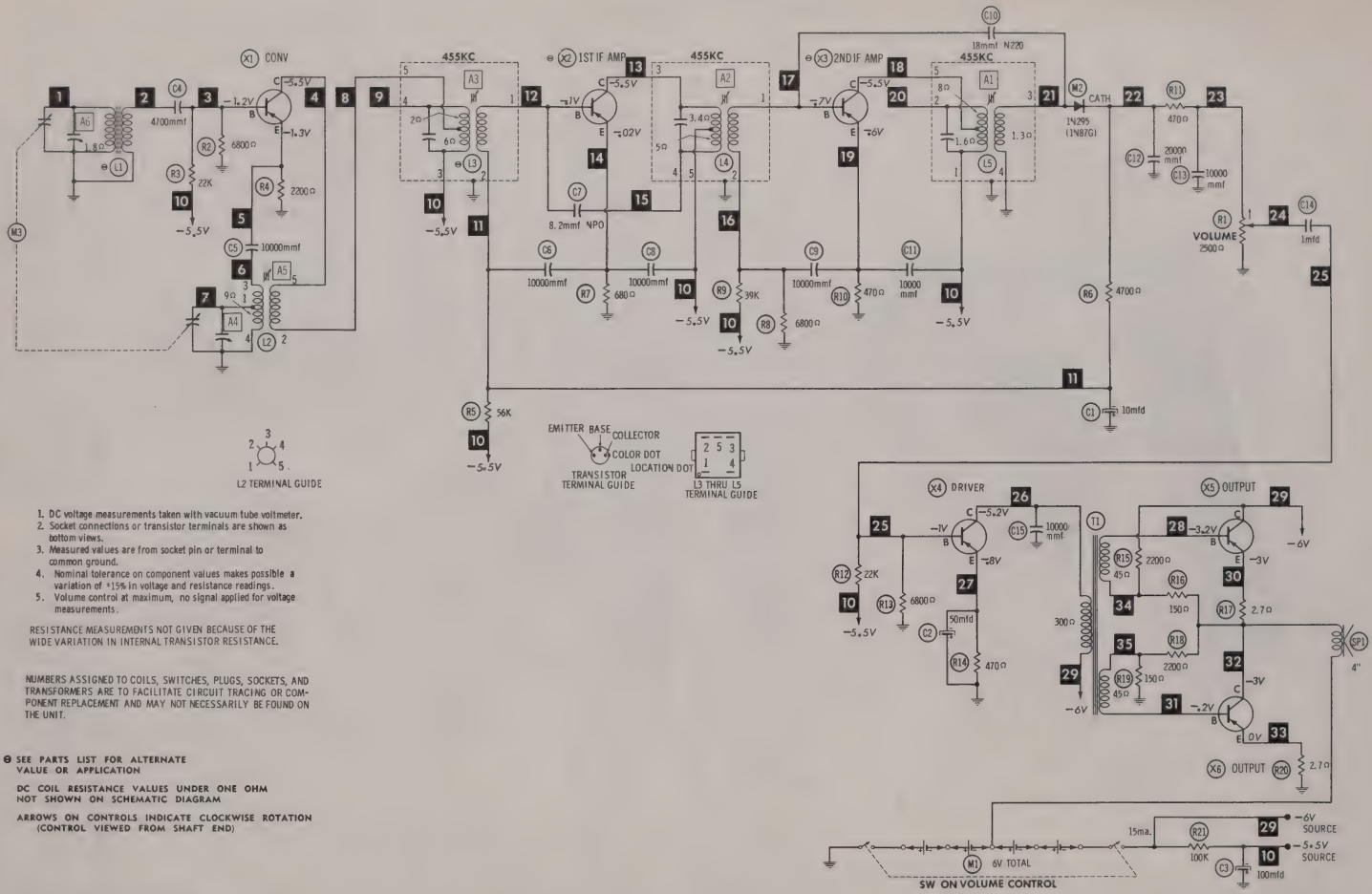
SET 539 FOLDER 16



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE

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WESTINGHOUSE CHASSIS V-2397-4

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	PART NO.	USE	REPLACEMENT DATA: RCA PART No.	REPLACEMENT DATA: RAYTHEON PART No.	REPLACEMENT DATA: SYLVANIA PART No.	NOTES
X1	297V011H01	Converter				PNP
X2	297V012H05	1st IF Amplifier				PNP
	297V012H06 *	1st IF Amplifier				PNP
	297V012H04 *	1st IF Amplifier				PNP
	297V012H01 *	1st IF Amplifier				PNP
X3	297V012H06	2nd IF Amplifier				PNP
	297V012H05 *	2nd IF Amplifier				PNP
	297V012H04 *	2nd IF Amplifier				PNP
	297V012H01 *	2nd IF Amplifier				PNP
X4	297V004H03	Driver				PNP
X5	297V003H06	Output				PNP) Matched
X6	297V003H06	Output				PNP) Pair

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: Westinghouse PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	10	10	218V012H16	PTT-10010	NLW10-15	TT12X10	MLV10-10	TE-1114	
C2	50	10	218V012H01	PTT-10050	NLW50-10	TT10X50	MLV50-10	TE-1119	
C3	100	15	218V048H04	PTT-15100	NLW100-15	TT15X100	MLV100-15	TE-1162	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ELMENCO PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: SPRAGUE PART No.
C4	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	5HK-D47
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C6	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C7	8.2 NPO		NPO-DI 8.2		C10V82C			10TCC-V82
C8	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C9	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C10	18 N220	#215V314H09				*		10TCR-Q18
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C12	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C13	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C14	1mfd 3V	#215V309H54		UK-105				
C15	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10

\# Westinghouse Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Westinghouse PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	2500Ω	½	270V084H01					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: WORKMAN TV PART No.	REMARKS
R2	6800Ω			
R3	22K			
R4	2200Ω			
R5	56K			
R6	4700Ω			
R7	680Ω			
R8	6800Ω			
R9	39K			
R10	470Ω			
R11	470Ω			

ITEM No.	RATING	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: WORKMAN TV PART No.	REMARKS
R12	22K			
R13	6800Ω			
R14	470Ω			
R15	2200Ω			
R16	150Ω			
R17	2.7Ω			
R18	2200Ω			
R19	150Ω			
R20	2.7Ω			
R21	100Ω			

PRINTED BOARD

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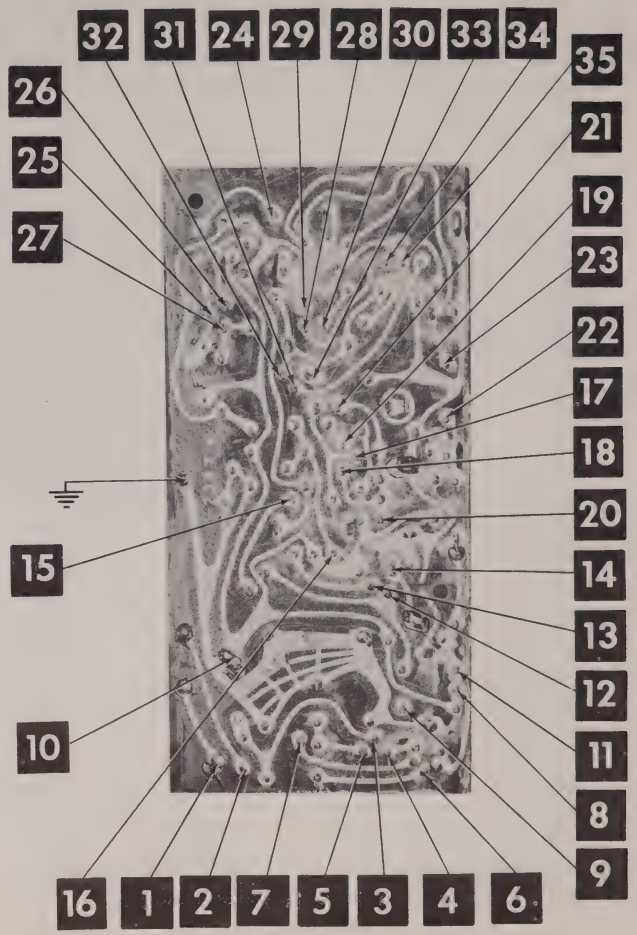


WESTINGHOUSE
CHASSIS V-2397-4

FOLDER 16

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		Westinghouse PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L1	Loopstick	310V061H01 ①				TA593	① Part #310V048H01 used in some versions. ② Part #235V070H03 used in some versions.
L2	Osc.	230V092H01				TA594	
L3	1st IF	235V070H01 ②				TB651	
L4	2nd IF	235V070H02				TB652	
L5	3rd IF	235V071H01				TB649	

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	Westinghouse PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	3	1	430V100H01					
		SEC. 2						
		1						

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	QUAM PART No.	
SP1	4"	PM	40-50Ω	570V088H01	4A05Z45	

BATTERIES

ITEM No.	VOLTAGE	Westinghouse PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V			130 *		635 *		M-14R*	* 4 Required

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Westinghouse PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N295 1N87G	296V002H01		1N295 1N87G	1N295 1N87G	Detector (Pigtail) Alternate

MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M3	Tuning Cap.	330V027H01	2 Gang

CABINETS & CABINET PARTS

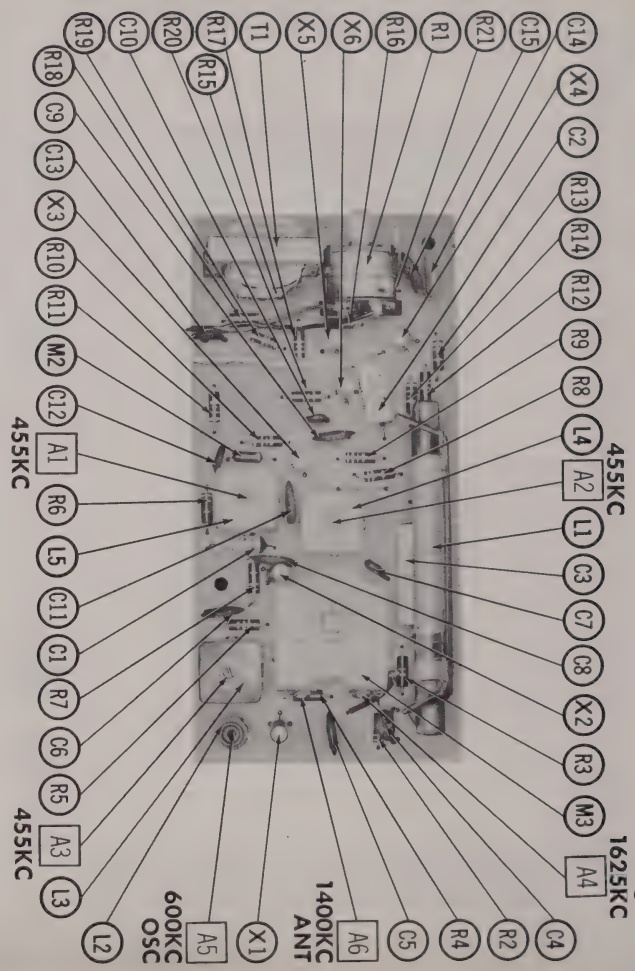
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	550V080H09	Tuning
Knob	550V098H03	Volume
Cabinet	513V080H02	Back, Red, Model H-725P6A
Cabinet	513V080H01	Front, White, Model H-725P6A, H-726P6A
Cabinet	513V080H04	Back, Turquoise, Model H-726P6A
Cabinet	513V080H03	Back, White, Model H-727P6A, H-728P6A, H-771P6, H-771P6GP, H-772P6, H-772P6GP, H-773P6, H-773P6GP
Cabinet	513V080H05	Front, Mist Green, Model H-727P6A
Cabinet	513V080H06	Front, Charcoal, Model H-728P6A, H-771P6, H-771P6GP
Cabinet	513V080H07	Front, Ivory, Model H-772P6, H-772P6GP
Cabinet	513V080H08	Front, Vermilion, Model H-773P6, H-773P6GP
Case	513V063H01	Carrying, Model H-771P6GP, H-772P6GP, H-773P6GP
Handle	558V217H03	Model H-771P6, H-771P6GP, H-728P6A

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



PHOTOFACT® Folder

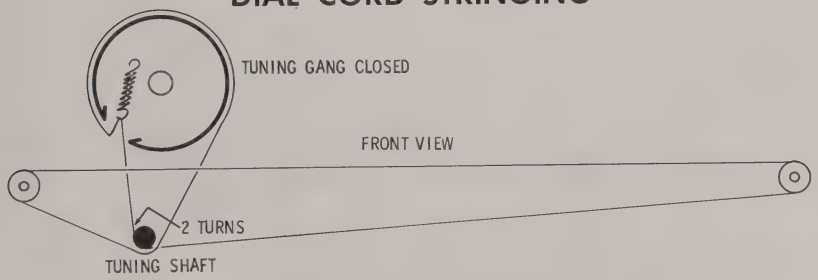
**ZENITH MODEL
ET10 (Ch. 7E20)**

ZENITH MODEL
ET10 (Ch. 7E20)

ZENITH MODEL
ET10 (Ch. 7E20)

TRADE NAME	Zenith Model ET10 (Ch. 7E20)		
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Illinois		
TYPE SET	AC Operated 7 Tube FM-AM Tuner		
POWER SUPPLY	110 – 120 Volts AC, 60 Cycles	RATING	30 Watts, .33 Amp. @117 Volts AC
TUNING RANGE—BROADCAST	540 – 1600KC	FREQ. MOD.	88 – 108MC

DIAL CORD STRINGING



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KL289

SET 539 FOLDER 17

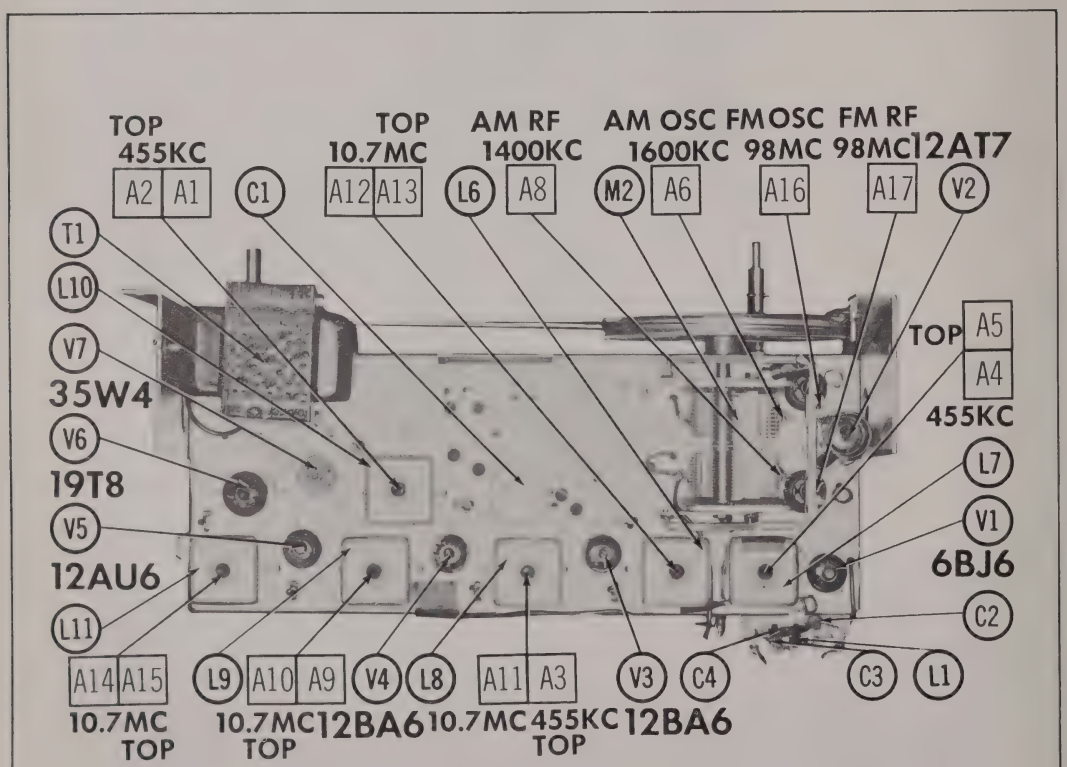
AM ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use only enough generator output to provide a usable indication.
Suggested Alignment Tools: A1 thru A5, A7, A8 thru A15....GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440
WALSCO #2526, 2543, 2544, 2545
A6, A7.....GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

AM ALIGNMENT — SELECTOR IN AM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	High side thru .05mfd to pin 2 (grid) of Mixer. Low side to chassis.	455KC (400∿ Mod.)	(AM) Tuning gang fully open.	DC probe to point Ⓐ. Common to chassis.	A1, A2, A3, A4, A5	Adjust for maximum deflection.
2.	Loop	1600KC	1600KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	600KC	600KC	"	A7	"
4.	"	1400KC	1400KC Signal.	"	A8	Adjust for maximum deflection while rocking tuning gang.



CHASSIS—TOP VIEW

FM ALIGNMENT INSTRUCTIONS

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM—SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	High side thru .05mfd to pin 2 (grid) of Mixer. Low side to chassis.	10.7MC (Unmod.)	(FM) Point of non-interference.	DC probe to point Ⓑ. Common to chassis.	A9, A10, A11, A12, A13	Adjust for maximum deflection.
6.	"	"	"	DC probe thru 1meg to point Ⓒ. Common to chassis.	A14	"
7.	"	"	"	DC probe to point Ⓓ. Common to chassis.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE—SELECTOR IN FM POSITION

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	High side thru .05mfd to pin 2 (grid) of Mixer. Low side to chassis.	10.7MC (450KC Swp)	(FM) Point of non-interference.	Vert. amp. to point Ⓑ. Low side to chassis.	A9, A10, A11, A12, A13	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown.
6.	"	"	"	Vert. amp. thru 47K to point Ⓒ. Low side to chassis.	A14	"
7.	"	"	"	Vert. amp. to point Ⓓ. Low side to chassis.	A15	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A14 for maximum amplitude and straightness of cross-over lines.

FM RF ALIGNMENT — SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	Across FM antenna terminals with 270Ω in high side.	98MC (Unmod.)	(FM) 98MC	DC probe to point Ⓑ. Common to chassis.	A16, A17	Adjust for maximum deflection.

FIG. 1

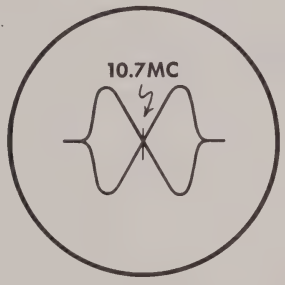
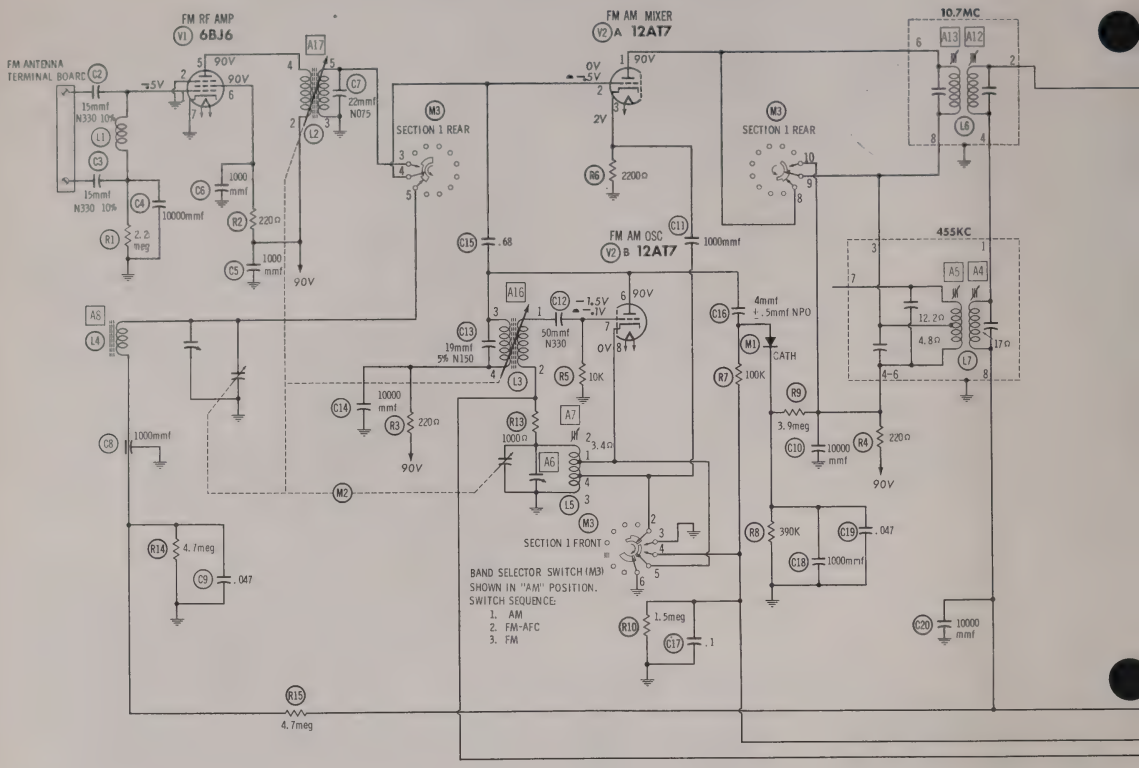


FIG. 2



RESISTANCE READINGS

TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1 6BJ6	2.2meg	0Ω	60Ω	64Ω	†820Ω	†1000Ω	0Ω		
V2 12AT7	†1000Ω	0Ω •3meg	2200Ω	64Ω	70Ω	†1000Ω	10K	0Ω	NC
V3 12BA6	2.2meg	0Ω	70Ω	71Ω	†1000Ω	†1000Ω	0Ω		
V4 12BA6	100K	0Ω	71Ω	69Ω	†1000Ω	†1000Ω	100Ω		
V5 12AU6	100K	0Ω	32Ω	30Ω	†16K	†16K	0Ω		
V6 19T8	150K	150K	300K	0Ω	30Ω	380K	0Ω	NC	NC
V7 35W4	TP	NC	60Ω	13Ω	13Ω	NC	¶		

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
• MEASURED IN "AM" POSITION.
† MEASURED FROM PIN 7 OF V7.
NC NO CONNECTION
TP TIE POINT
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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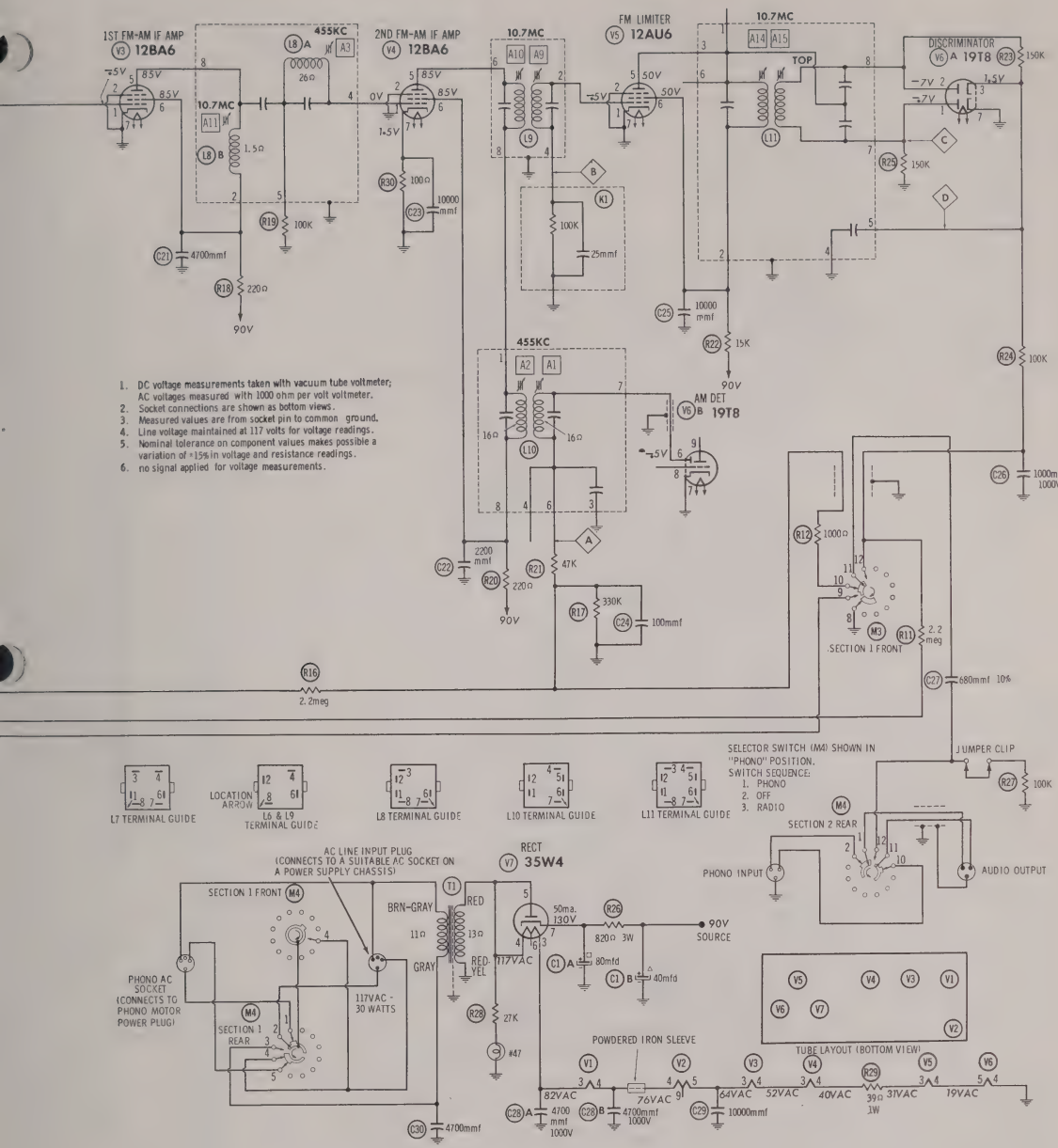
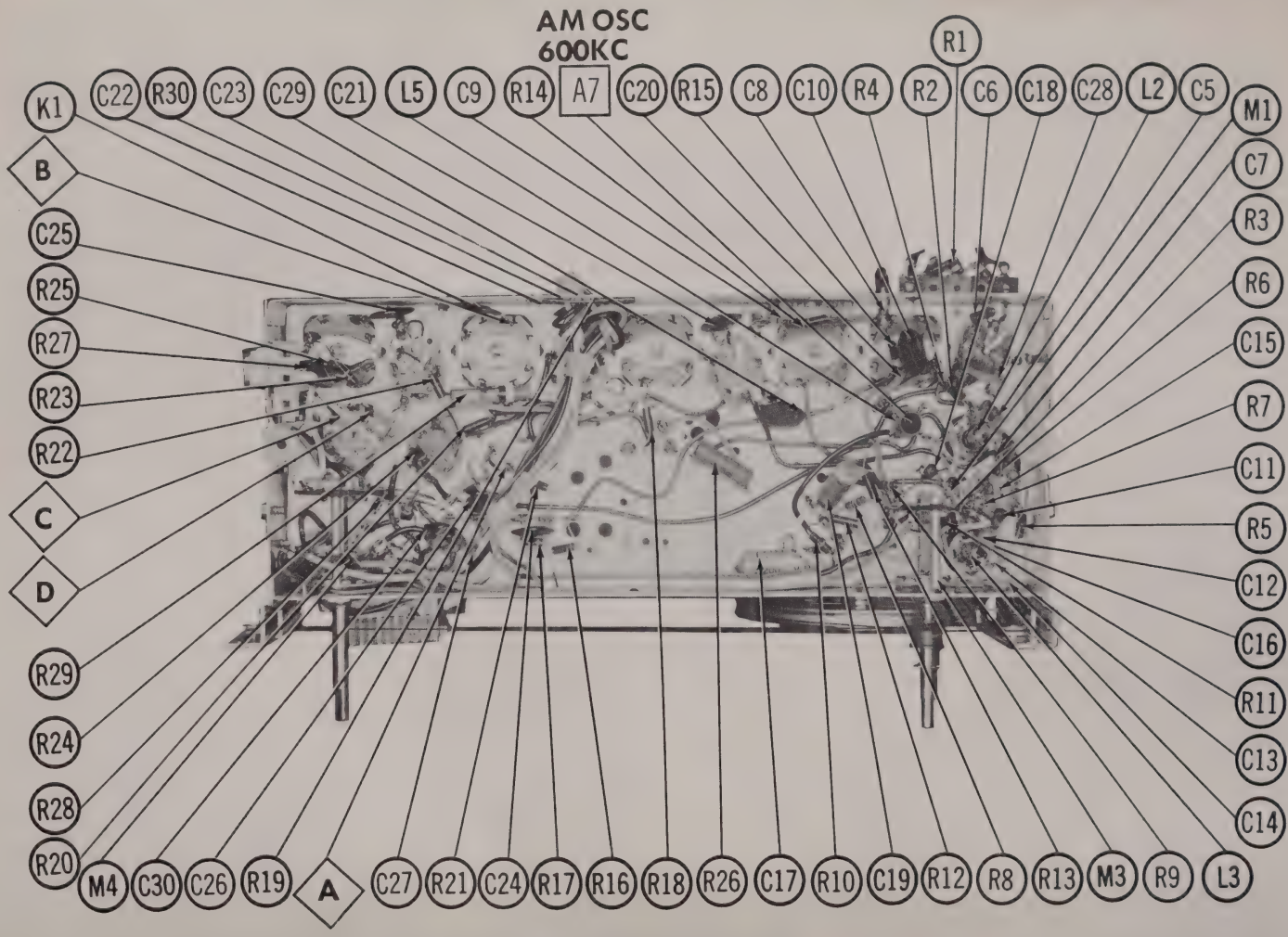


1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

ZENITH MODEL ET10 (Ch. 7E20)



CHASSIS-BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE
V1	FM RF Amp.	6BJ6
V2	FM-AM Mixer-FM-AM Osc.	12AT7
V3	1st FM-AM IF	12BA6
V4	2nd FM-AM IF Amp.	12BA6
V5	FM Limiter	12AU6
V6	Discriminator- AM Det.	19T8
V7	Rectifier	35W4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■80	150	22-3056	AFH2-19	XB0181	FP216.2	TMD-2135	TVL-2442	
B	▲40	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	15 10% N330			TCA-15		*		10TCS-Q15
C3	15 10% N330			TCA-15		*		10TCS-Q15
C4	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C5	1000		SI 1000	D6-102	BYA10D1	CCD-102	B-210	5HK-D10
C6	1000		SI 1000	D6-102	BYA10D1	CCD-102	B-210	5HK-D10
C7	22 N075	#22-2372						
C8	1000		EF-001	MFT-1000		CCF-102	CT280A	
C9	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C10	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	1000		SI 1000	D6-102	BYA10D1	CCD-102	B-210	5HK-D10
C12	50 N330	#22-2370		TCA-47		*		10TCS-Q47
C13	19 5% N150	#22-3231				*		
C14	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C15	.68		NPO-SI .68	TCZ-R68				
C16	4 +.5mmf NPO	#22-2549			C10V4C			10TCC-V39
C17	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C18	1000		SI 1000	D6-102	BYA10D1	CCD-102	GP210	5HK-D10
C19	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C20	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C21	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	5HK-D47
C22	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C23	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C24	100		DI-100	DD-101	L10T1	CCD-101	GP310	10TS-T10
C25	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C26	1000 1000V		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C27	680 10%		DI-680	DD-681		CCD-681	GP368	10TS-T68
C28A	4700 1000V		BPD-2X0047	DD-472	BYA10D47M	CCD-472	B2X250	5HK-2D47
B	4700			DD-472	BYA10D47M	CCD-472		
C29	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C30	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-247	5HK-D47

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
# Zenith Part Number.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ZENITH PART No.	REPLACEMENT DATA
K1	Limiter Grid Filter	25mmf, 100K	105-42	Sprague PRC-11

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R1	2.2meg			
R2	220Ω			
R3	220Ω			
R4	220Ω			
R5	10K			
R6	2200Ω			
R7	100K			
R8	390K			
R9	3.9meg			
R10	1.5meg			
R11	2.2meg			
R12	1000Ω			
R13	1000Ω			
R14	4.7meg			
R15	4.7meg			

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN TV PART No.	REMARKS
R16	2.2meg			
R17	330K			
R18	220Ω			
R19	100K			
R20	220Ω			
R21	47K			
R22	15K			
R23	150K			
R24	100K			
R25	150K			
R26	820Ω 3W	PW5-820	5W-SQ-820	
R27	100K			
R28	27K			
R29	39Ω 1W			
R30	100Ω			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA ZENITH PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	NOTES
L1	FM Ant. (1.1uh)	20-682	BC-561	4602	RTC-8515	T855	
L2	FM RF	S-13871					
L3	FM Osc.	S-15691				T532	
L4	Loopstick	S-49113	BC-419	705-A 71-OSC			
L5	AM Osc.						▲ Enlarge mounting hole
L6	1st FM IF	95-1150	FM-251 ▲	1451 ▲	RTC-9038 ▲	T630 ▲	* Use adapter plate
L7	1st AM IF	95-1250					
L8A	2nd FM IF	95-1251					
B	2nd AM IF						
L9	3rd FM IF	95-1150	FM-251 ▲	1451 ▲	RTC-9038 ▲	T630 ▲	
L10	3rd AM IF	95-1102	BC-355 *	12-C6 *	RTC-8634 *	T609	
L11	Discriminator	95-1153					

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA ZENITH PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	117V Ⓐ .33A AC	117V Ⓐ .240A AC		95-1744					

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA ZENITH PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
M1		103-29				AFC (Silicon Diode, Pigtail)

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M2	Tuning Cap.	22-3039	2 Gang (Ant. 7—403mmf, Osc. 9—134mmf)
M3	Switch	85-644	Band Selector (Rotary Wafer Type)
M4	Switch	85-643	Function (Rotary Wafer Type)

CABINETS & CABINET PARTS

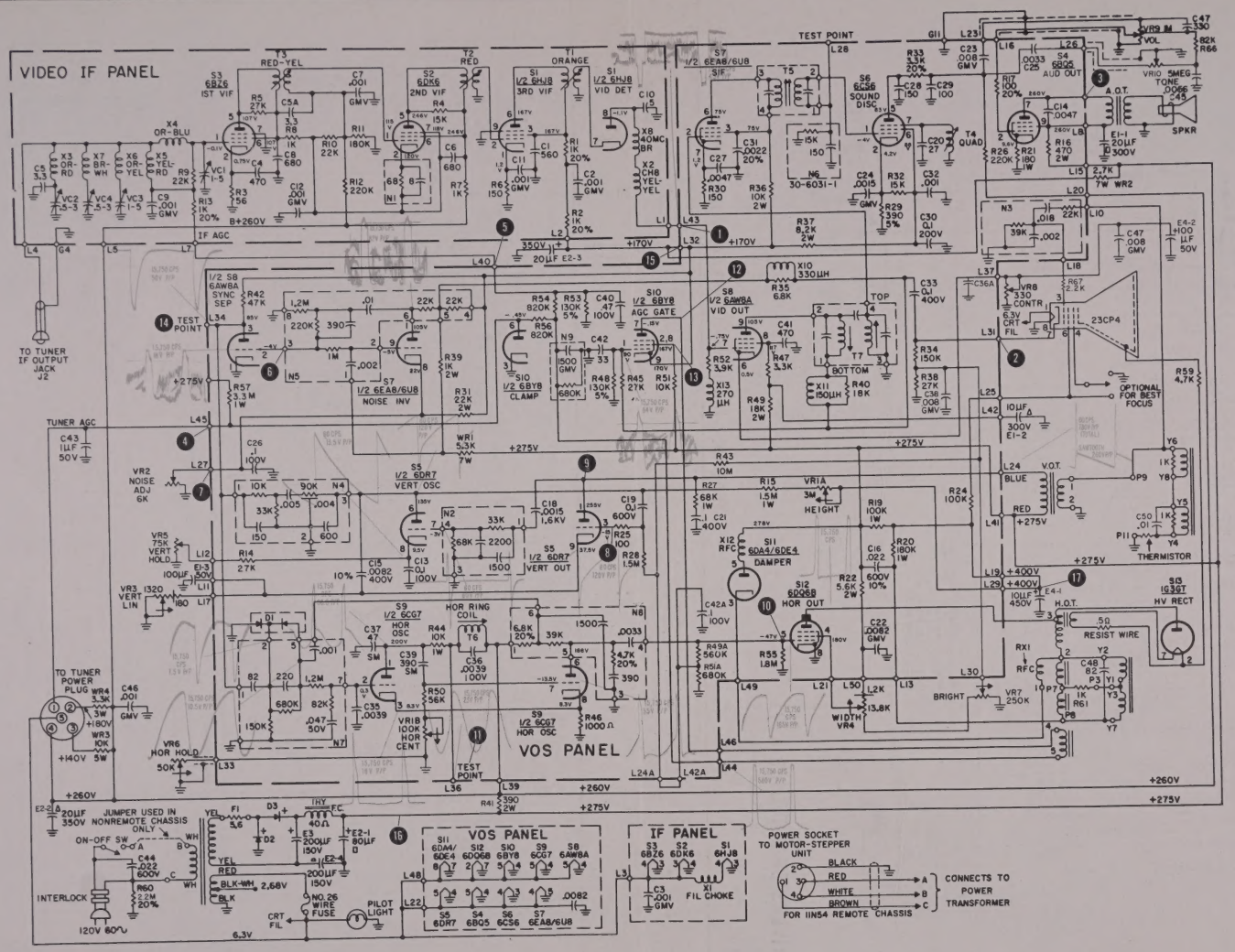
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Dial Glass	192-292	
Dial Scale	26-669	
Knob	S-49124	Tuning, With Clamping Ring
Knob	S-47748	Band Switch, With Clamping Ring
Knob	S-47939	Radio-Off-Phono, With Clamping Ring

WIRING DATA

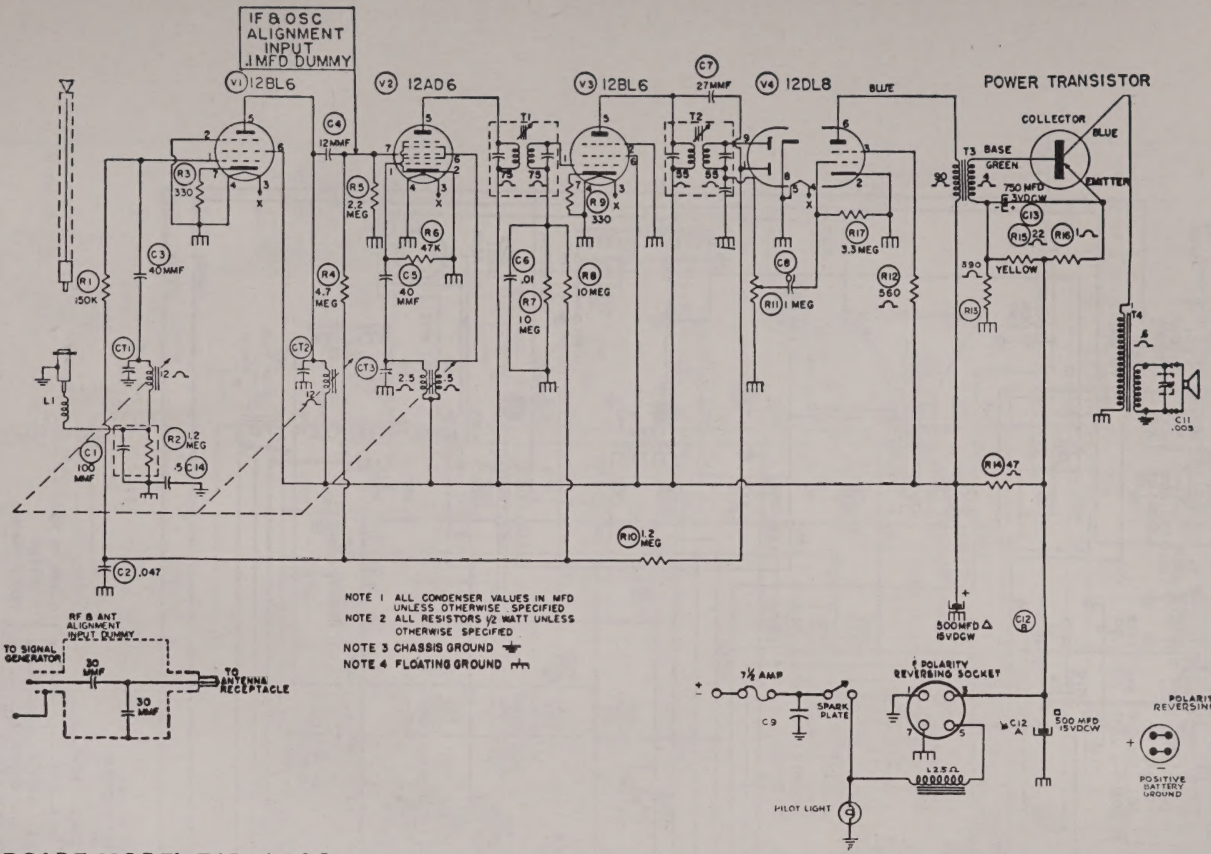
General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)



PHILCO CHASSIS 11N53, 11N54

Schematic Diagram Courtesy of Philco Corporation



RIVERSIDE MODEL FJB-6591

Schematic Diagram Courtesy of Montgomery Ward & Co.

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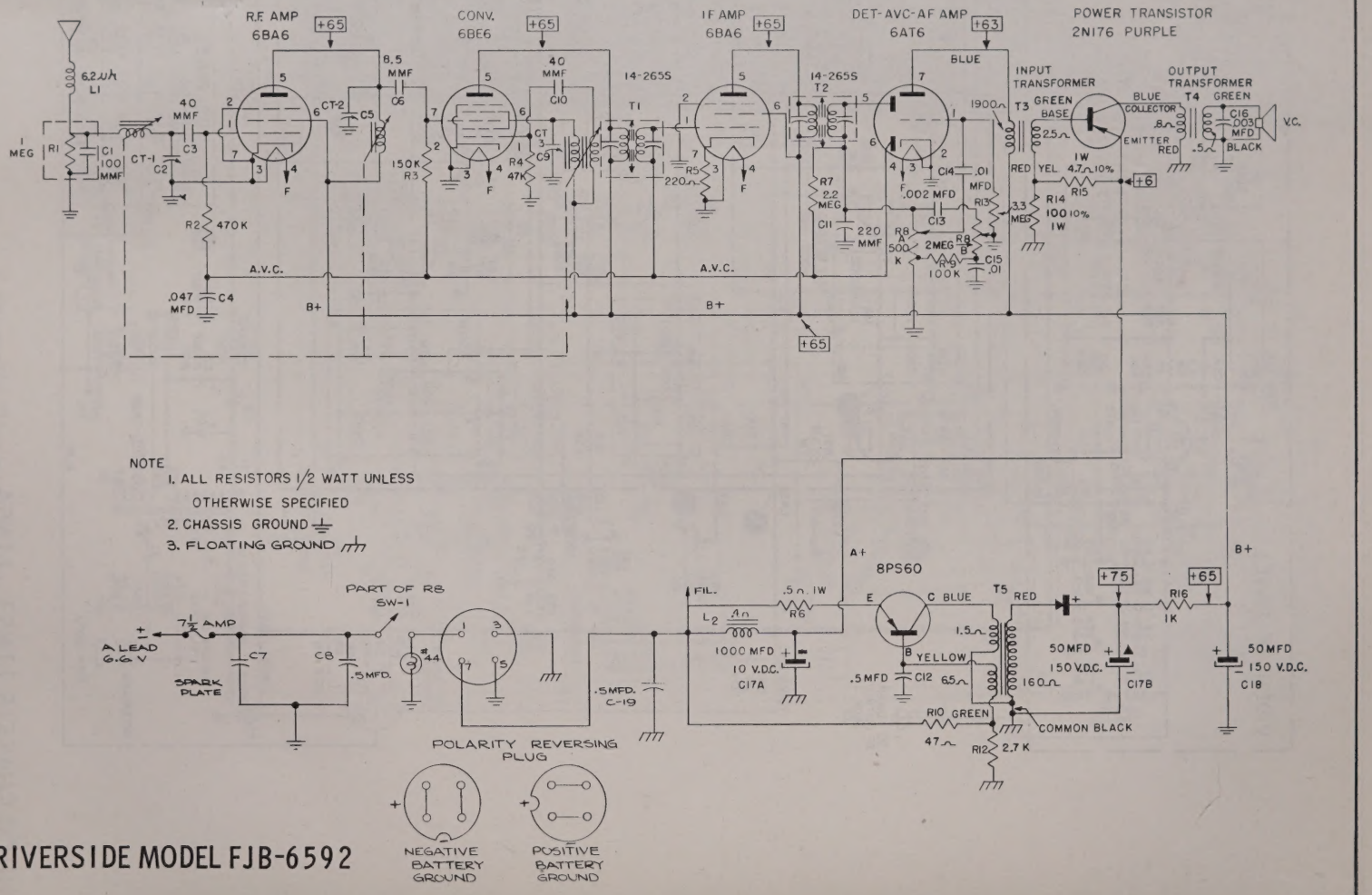

RIVERSIDE MODEL FJB-6592

Schematic Diagram Courtesy of Montgomery Ward & Co.